Liebert® iCOM®

User Manual -Intelligent Communications & Monitoring for Liebert Challenger 3000™, Liebert Challenger ITR™ , Liebert CW™, Liebert DS™ Liebert PeX™ with Software Version PA2.01.029.04R

EMERSON
Network Power

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1.0 INTRODUCTION

The Liebert iCOM offers the highest capabilities in unit control, communication and monitoring of Liebert mission-critical cooling units.

Liebert iCOM may be used to combine multiple cooling units into a team that operates as a single entity, enhancing the already-high performance and efficiency of Liebert's units.

Liebert iCOM is available as a factory-installed assembly or may be retrofitted on existing products with SM, AM or AG controls. Large graphic display wall-mount versions of the control are available for remote operation and monitoring of cooling units.

1.1 Features

Large and Small Displays

The Liebert iCOM is available with either a large or small liquid crystal display.

- The **Liebert iCOM with small display** has a 128 x 64 dot matrix screen that simultaneously shows two menu icons, along with descriptive text. This display is capable of controlling only the unit it is directly connected to.
- The **Liebert iCOM with large display** has a 320 x 240 dot matrix screen that shows up to 16 menu icons at a time, as well as descriptive text. This display can be used to control a single cooling unit or any cooling unit on a network, regardless of how it is connected—either integrated into a cooling unit or simply connected to the network and mounted remotely.

Liebert iCOM's menu-driven display is used for all programming functions on each connected cooling unit. The Status menu shows the status of the conditioned space, such as room temperature and humidity, temperature and humidity setpoints, alarm status and settings, event histories and the current time.

Figure 1 Liebert iCOM components

Wall Mount Large Display

Direct Panel Mount Large Display and Bezel

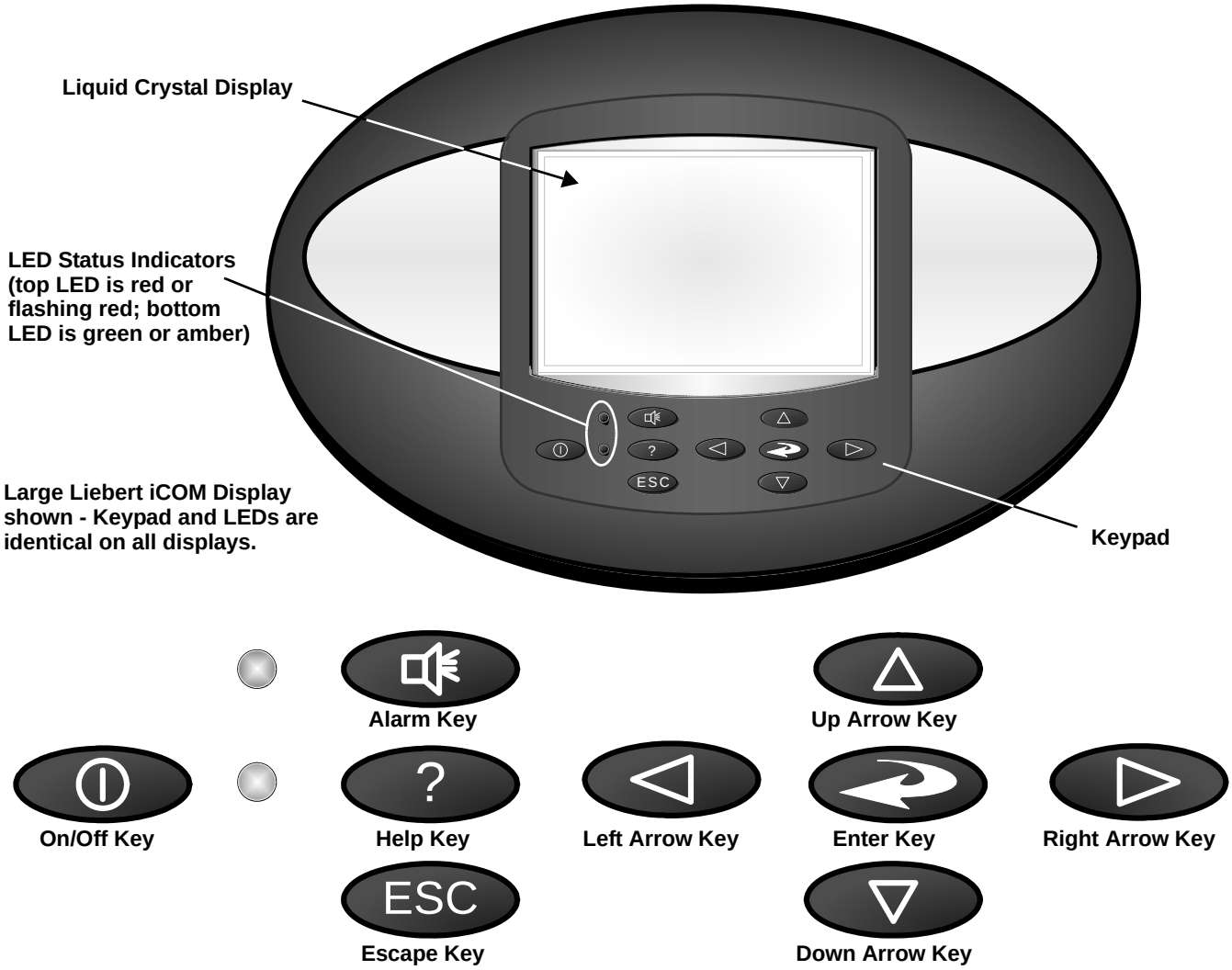
Direct Panel Mount Small Display and Bezel

Liebert iCOM Input/Output Board

2.0 LIEBERT iCOM DISPLAY COMPONENTS AND FUNCTIONS

The small and the large display have a common key layout, as shown in **Figure 2**.

Figure 2 Liebert iCOM display components


Liquid Crystal Display
LED Status Indicators (top LED is red or flashing red; bottom LED is green or amber)
Large Liebert iCOM Display shown - Keypad and LEDs are identical on all displays.
Keypad
ESC
Alarm Key
Up Arrow Key
On/Off Key
Help Key
Left Arrow Key
Enter Key
Right Arrow Key
Escape Key
Down Arrow Key

NOTE

The Help key may be pressed at any time for a brief explanation of what is being viewed.

NOTICE

Risk of inadvertent system shutdown. Can cause loss of cooling and equipment damage.

Pressing the On/Off key on a Liebert iCOM large display while the system screen is shown permits shutting down all units on the network.

Large Liebert iCOM displays can view and control other units on the network when they are in the same group. When turning a unit Off or On with the large display, make sure that the unit to be shut down or started up is shown on the screen. If the system screen is shown and the On/Off key is pressed, the Liebert iCOM shows a notification that pressing the On/Off key again will turn Off all units on the network.

Table 1 Keyboard icons and functions

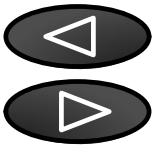
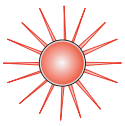
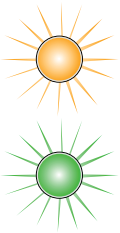
Icon	Key Name	Function
	On/Off Key	Begins Shutdown or Startup.
	Alarm Key	Silences/Resets an alarm.
	Help Key	Accesses integrated help menus.
	ESCape Key	Returns to the previous display view.
	Enter Key	Confirms all selections and selects icons or text.
	Increase Key (Up Arrow)	Moves upward in a menu or increases the value of a selected parameter.
	Decrease Key (Down Arrow)	Moves downward in a menu or reduces the value of a selected parameter.
	Left and Right Arrow Keys	Navigates through text and sections of the display.
	Upper LED	Blinking Red—Active, unacknowledged alarm exists
		Solid Red—Active, acknowledged alarm exists
	Lower LED	Amber—Power is available to the unit, unit is NOT operating
		Green—Power is available to the unit, unit is operating
	Lower LED	Green and Amber LEDs will flash alternately when the unit is in Standby

Figure 3 Status menu, large display, graphical view

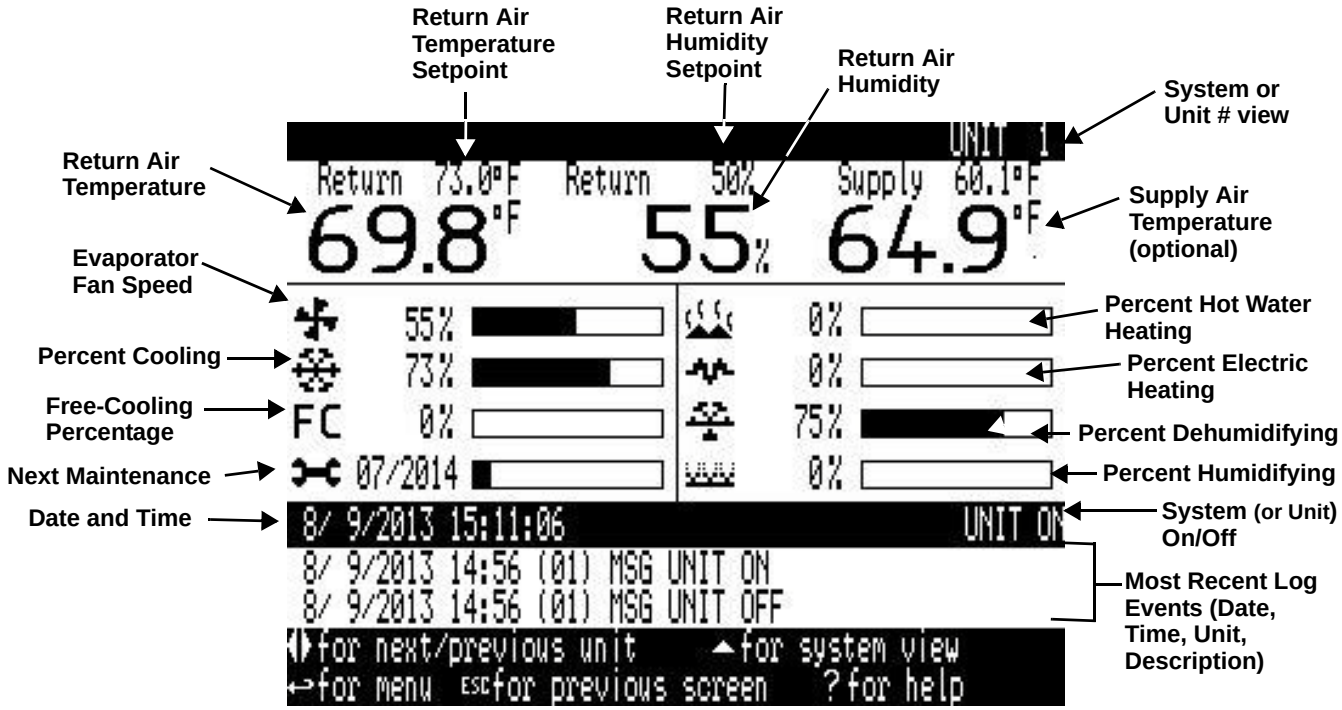
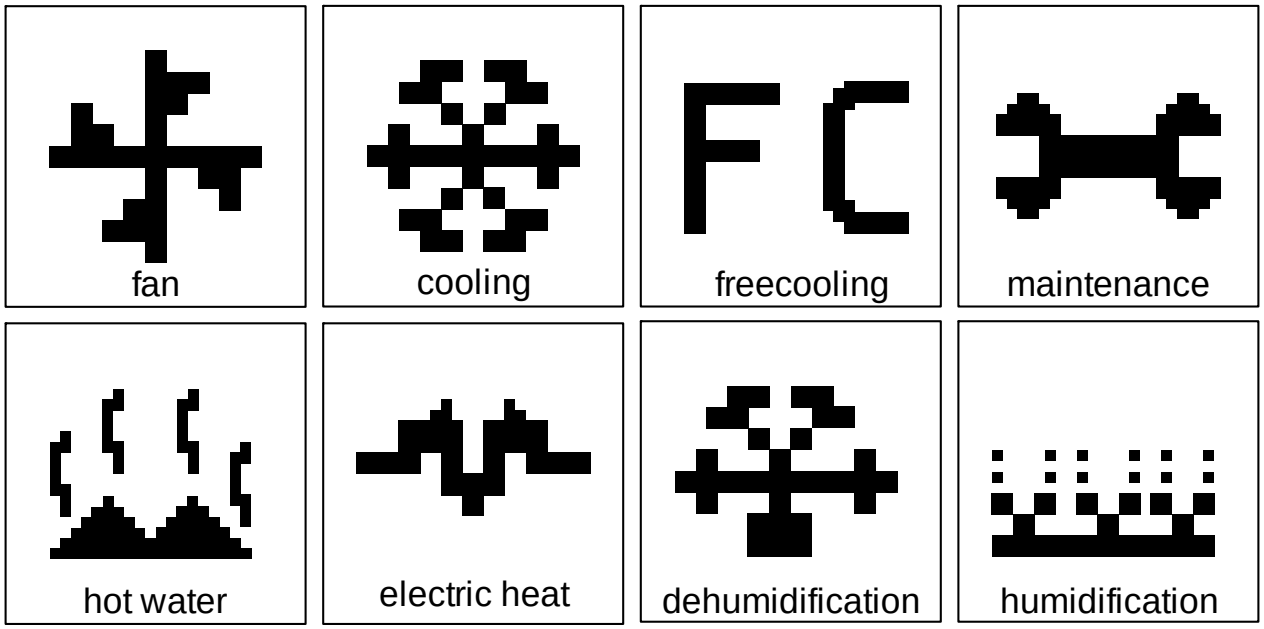


Figure 4 Liebert iCOM default screen symbols

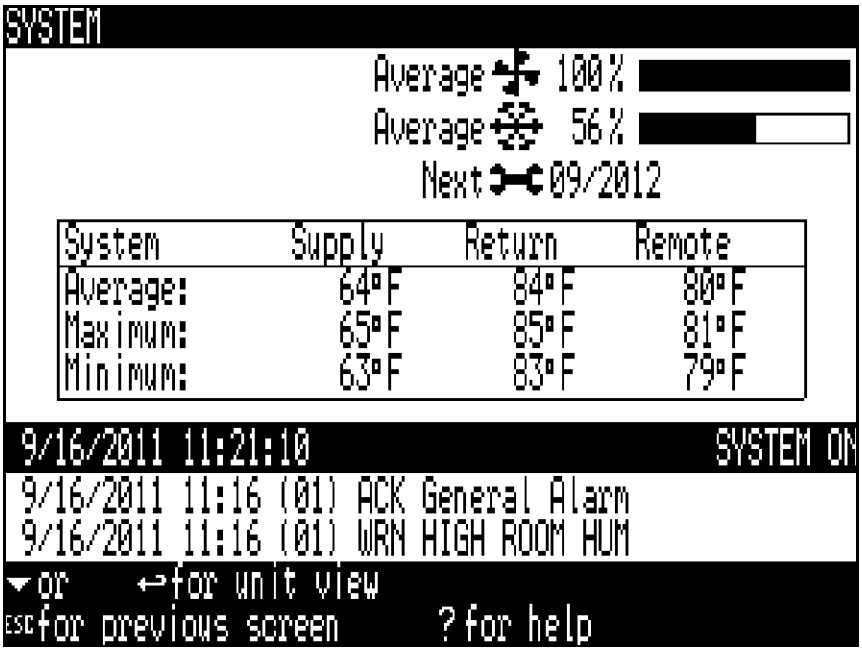


2.1 System Screen

The System Screen with Rack View of Sensors will display the average, maximum and minimum of all connected sensors for the supply, return and remote sensors.

This system screen displays the temperature environment by displaying the sensor readings from all units connected in the network.

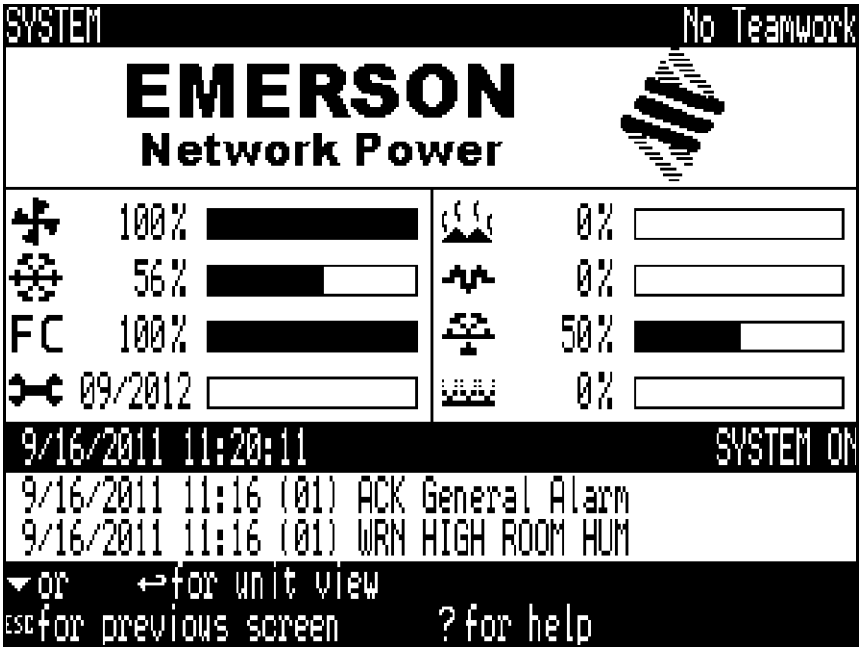
Figure 5 System screen with rack view of sensors



System Screen will indicate if Teamwork is turned On and which teamwork mode is currently set within the control.

This system screen displays the unit operation by displaying the average of all active components from each unit within the system.

Figure 6 System screen



2.2 Main Unit Screen

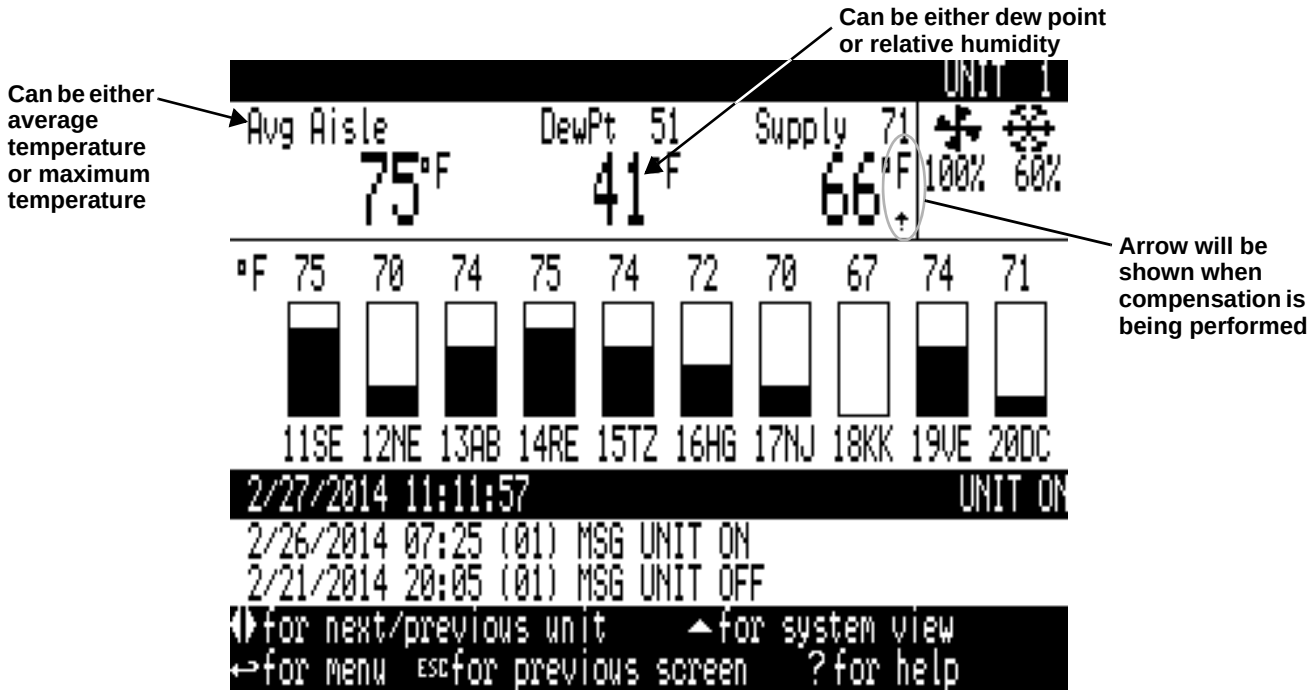
The temperatures shown at the top of the main unit screen are determined by the configuration of the Liebert iCOM. The values are based on which sensors are used for controlling airflow, cooling capacity and humidification.

The data at the upper left of the screen can be either average or maximum rack temperature, depending on the selection in the Remote Sensors Mode. The data at the upper middle of the screen can be either dew point or relative humidity, depending on humidity control type.

Each unit can display individual remote rack sensors. The reading will be either an average or maximum reading between the two sensors connected at each 2T sensor module.

The bar graph's upper limit is set at 77°F (25.0°C)The lower limit is set at 68°F (20.0°C), the rack inlet temperature range recommended by ASHRAE. When a rack temperature is at or above the upper limit, the bar graph will be all black. When a rack temperature is at or below the lower limit, the bar graph will be all white.

Figure 7 Main unit screen


Can be either dew point or relative humidity
Can be either average temperature or maximum temperature
Arrow will be shown when compensation is being performed
UNIT 1
Avg Aisle
DewPt 51
Supply 71
75°F
41°F
66°F
100% 60%
°F 75 70 74 75 74 72 70 67 74 71
11SE 12NE 13AB 14RE 15TZ 16HG 17NJ 18KK 19VE 20DC
2/27/2014 11:11:57
UNIT ON
2/26/2014 07:25 (01) MSG UNIT ON
2/21/2014 20:05 (01) MSG UNIT OFF
for next/previous unit
for system view
for menu
ESC for previous screen
? for help

2.3 Navigating Through the Liebert iCOM Menus

Liebert iCOM shows icons and text for monitoring and controlling your Liebert cooling units or network of cooling units. The number of icons and amount of text shown depends on the display size.

2.3.1 Control Interface

When the buttons on the Liebert iCOM have not been pressed for a short period, the display backlight turns Off. Pressing any key will turn the backlight on (wake up the screen) and display the Status menu of the last cooling unit viewed. The Status menu will show the cooling unit's operational mode(s), return air temperature and humidity readings, temperature and humidity setpoints and any active alarm conditions.

If the cooling unit has a large display and is not on a network, or if the unit has a small display, whether it is networked or stand-alone, the Status menu will display only that cooling unit's information. Any large display that is connected to a network can be used to view any cooling unit on the network or show an average view of the entire system of cooling units.

The Liebert iCOM has three main menus; User, Service and Advanced.

The User menu contains the most frequently used features, settings and status information. The Service menu contains settings and features used to set up unit communications and for unit maintenance. The Advanced menu contains settings used to set up the unit at the factory. Do not attempt to make any changes in the Advanced menu without consulting the factory first.

NOTE

Menu settings may be viewed without a password, but changing settings requires a password. The password for the User menu is 1490. The password for Service menu is 5010. For details on entering a password, see ***Entering a Password on page 10***

2.3.2 Accessing Submenus

While the display is at unit status screen, press either the Enter or down arrow key to display the User menu. To access the Service menu, press the right arrow key. Pressing the right arrow key again will display the Advanced menu. For navigating to the sub-menus from each main menu, press Enter key and then the appropriate arrow key. Pressing the Enter key again to access the menu items.

Figure 8 Menu tree—Small display, stand-alone or networked

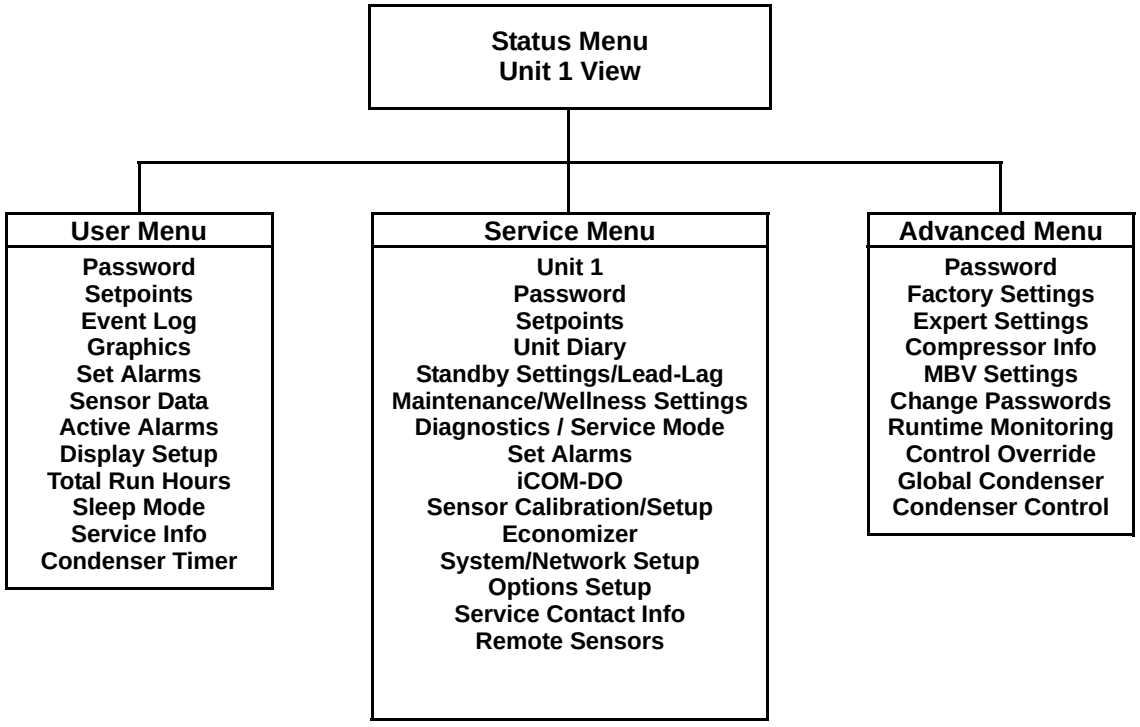


Figure 9 Navigation from system screen to unit screen to rack view—single unit

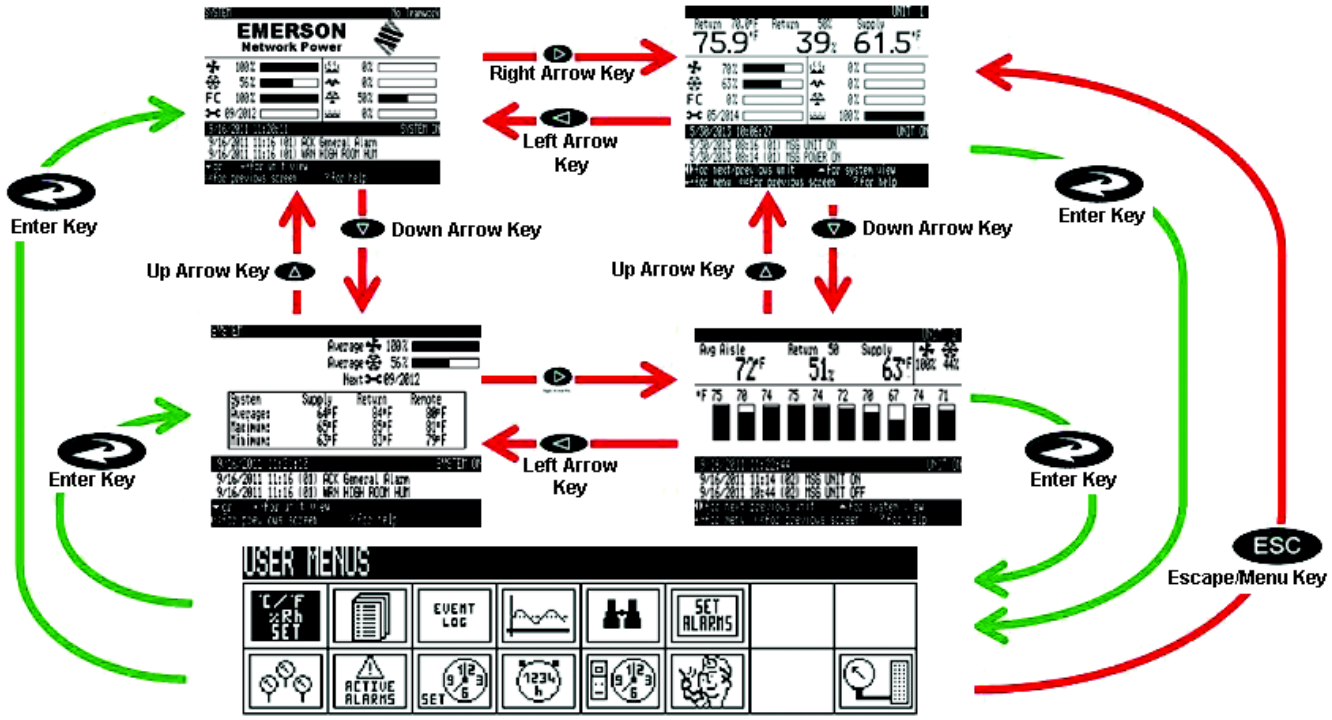
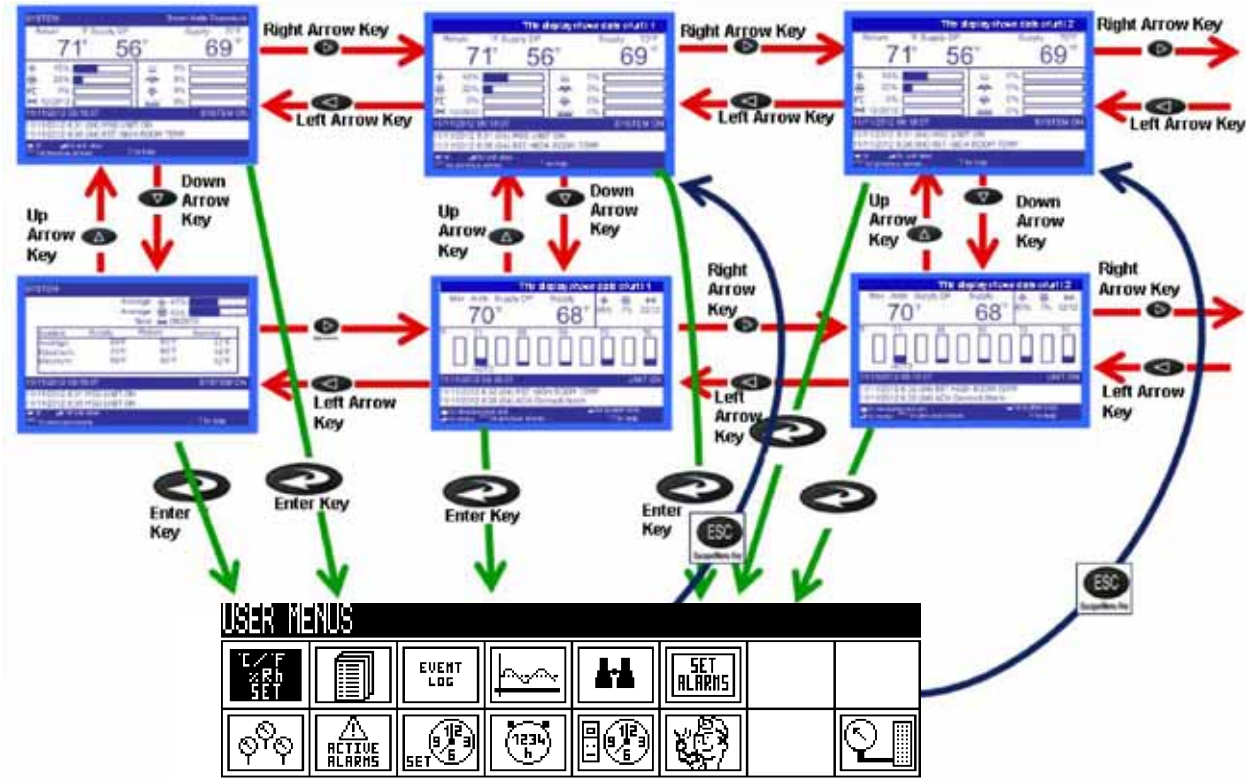


Figure 10 Navigation from system screen to unit screen to rack view—system view



Accessing Submenus on Small Displays

For navigating to submenus while at the main menu (User, Service or Advanced), use the up and down arrow keys to scroll through the icons page-by-page. To scroll through the icons one-by-one, press the enter key and then use the up and down arrow keys. With the desired icon highlighted, press the enter key to enter that submenu. Once in a Submenu, a list of menu items, each with its associated parameter, is displayed.

Press the Enter key and use the up and down arrow keys to navigate through the parameters one-by-one. Pressing the Esc key will go back a level. **Figure 8** shows the Liebert iCOM menus for a small display.

Display Filtering

Display filtering permits displaying only a single unit in the network on the large display. This allows each cooling unit to have a large display that acts as a local display Filtering can be enabled in the User/Display menu.

Accessing Submenus on Large Displays

Press the enter key from the main Liebert iCOM display to access the User, Service and Advanced menus. Then use the left / right arrows to move among the User, Service and Advanced menus. Press the enter key to highlight the first icon. Use the arrow keys to navigate through the icons. With the desired icon highlighted, press the enter key to enter that submenu. Once in a Submenu, a list of parameters will be displayed.

The up and down arrow keys may be used to scroll through the parameters page-by-page if the submenu has multiple pages. To scroll item-by-item, press the Enter key and then use the up and down arrow keys. Using the right or left arrow keys on large displays attached to a network will change the unit being viewed. Pressing the Esc key will go back a level. **Figures 12** and **13** show the Liebert iCOM menus for a stand-alone large display and for a networked large display, respectively.

NOTE
Settings are readable without a password, but changing settings requires a password.

2.3.3 Entering a Password

The password must be entered before any value of the menu item parameter can be changed. There are three levels of password for preventing unauthorized changes.

1. User menu password allows the operator the ability to change the parameters in the User menu. The User menu password is 1490.
2. Service menu password enables the operator to changes parameters in both Service and User. The Service menu password is 5010.
3. Advanced menu password allows the changes to be made in all parameters.

NOTE
Entering the Service menu password permits access to both the User and Service menus.

To enter a password:

1. Navigate to the menu that contains the parameter to be changed.
2. Select *Password* in the submenu by pressing the Enter key.
3. Press the Enter key to move your cursor to the right side of the screen to select the question marks.
4. Use the arrow keys to enter the numeral for the password's first digit (the up arrow key moves from 1 to the next digit).
5. Use the right arrow key to move to the next question mark and repeat **Step 4** to enter all digits in the password.
6. After entering the password, press enter.

If the password is correct, the *Actual Level* shown to the right of *Password* will change from 0 to 1 or 2. The menu will remain locked if the password was incorrect.

NOTE
Returning to the Status menu will require re-entering a password to make changes.

Figure 11 Entering a password

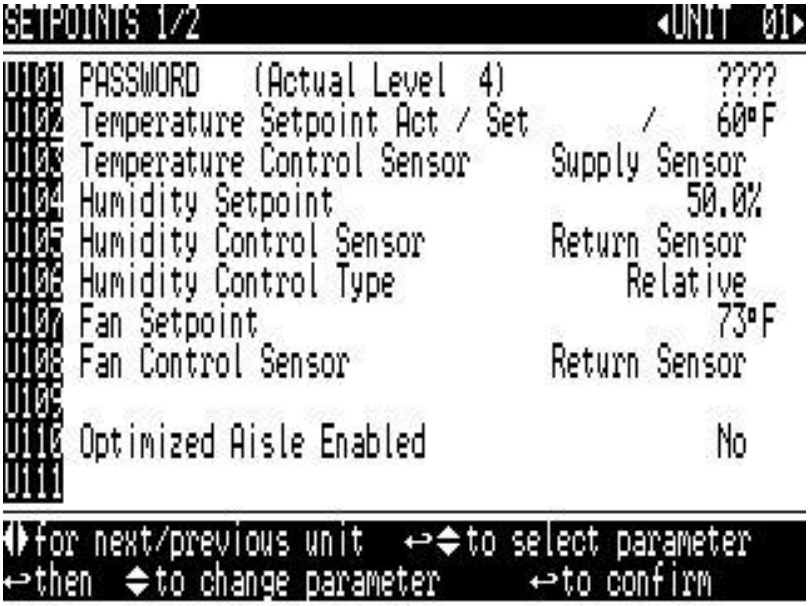
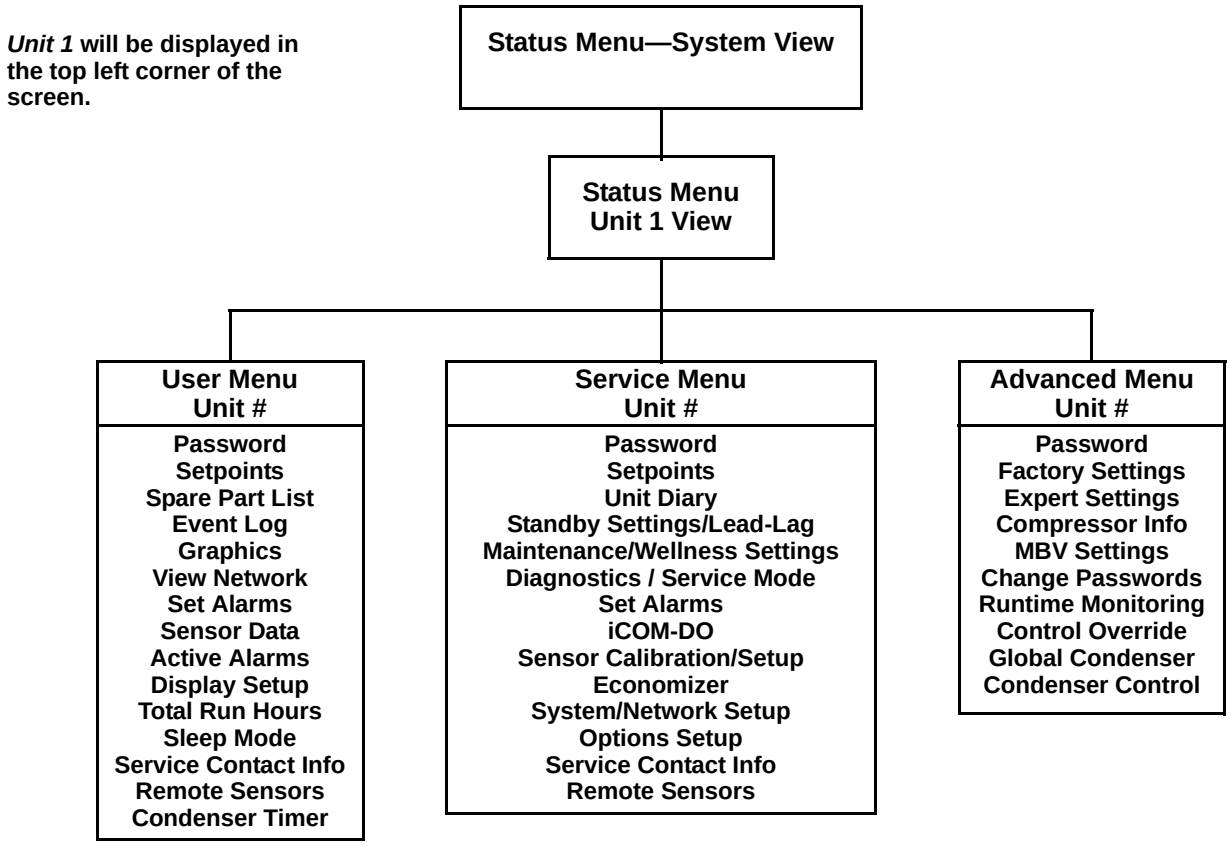

SETPOINTS 1/2
◂UNIT 01▸
U101 PASSWORD (Actual Level 4) ????
U102 Temperature Setpoint Act / Set / 60°F
U103 Temperature Control Sensor Supply Sensor
U104 Humidity Setpoint 50.0%
U105 Humidity Control Sensor Return Sensor
U106 Humidity Control Type Relative
U107 Fan Setpoint 73°F
U108 Fan Control Sensor Return Sensor
U109
U110 Optimized Aisle Enabled No
U111
◂▸for next/previous unit ↩◆to select parameter
↩then ◆to change parameter ↩to confirm

Figure 12 Menu tree—Large display, stand-alone



2.3.4 Viewing Multiple Units with a Networked Large Display

When you first wake up the control, press the Esc key to return to the System view Status menu. This view shows an average of all the units on the network and any alarms present. To view a specific unit on the network, press either the Enter key or down arrow key. When you do this, you will see the word *System* in the top left of the screen change to a unit number. Using the left and right arrow keys, you can toggle through the various units on the network. To go back to the System view, or back one level from any menu in the control, press the Esc key.

Figure 13 Menu tree—Large display, networked

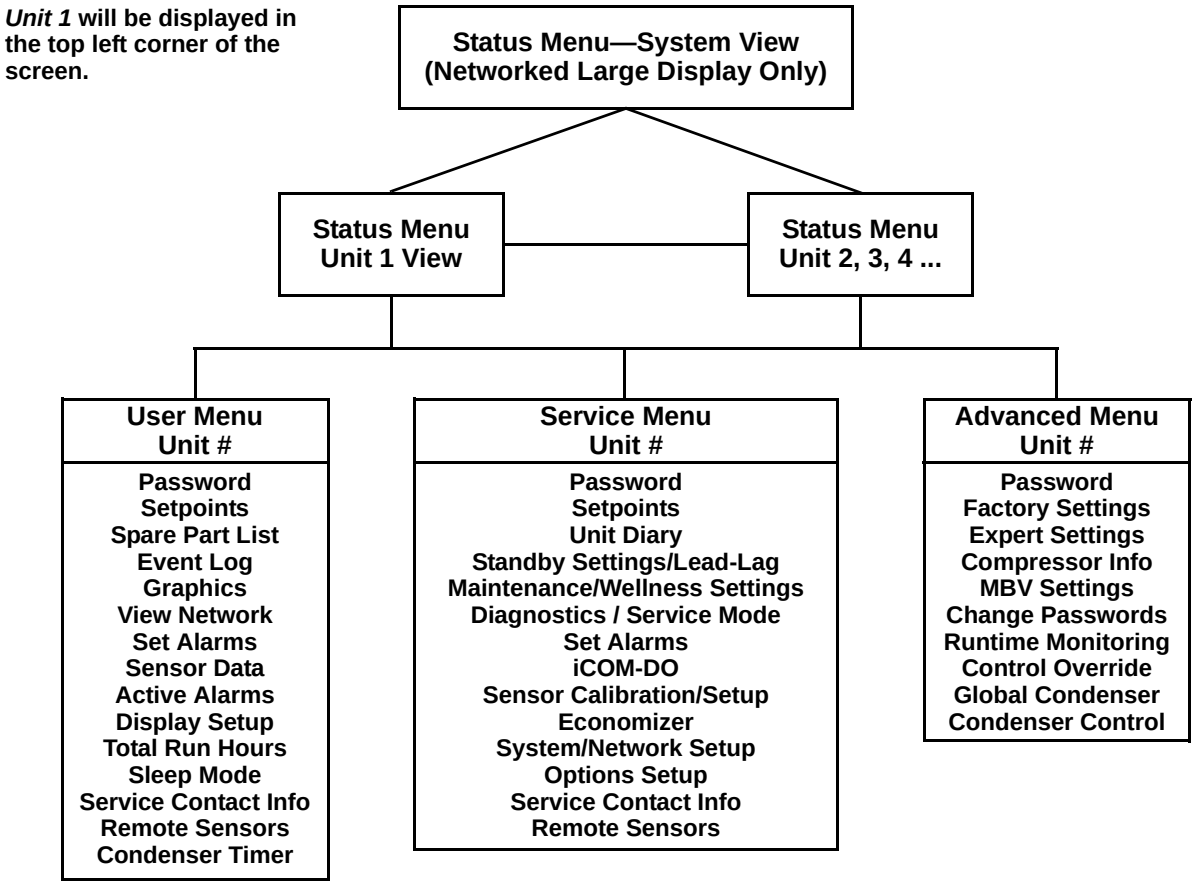
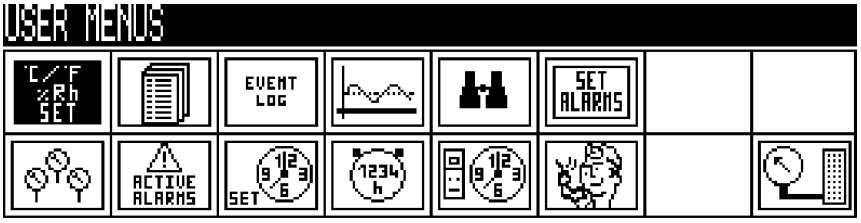


Figure 14 User menu icons



User Menu password: 1490

Table 2 User menu icons

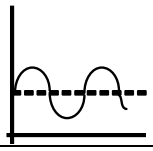
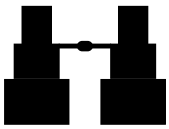
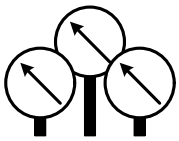
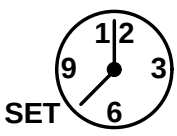
Icon	Name	Description	Available On Display
°C / °F % RH SET	Setpoints	View and change temperature and humidity setpoints	Small & Large
	Spare Part List	Displays the various part numbers of the components/parts in the cooling unit	Large
EVENT LOG	Event Log	Contains last 400 events	Small & Large
	Graphics	Displays temperature and humidity graphs	Small & Large
	View Network	Shows status of all connected units	Large
SET ALARMS	Set Alarms	Allows enable, disable and settings for alarms	Small & Large
	Sensor Data	Shows readings of standard and optional sensors	Small & Large
 ACTIVE ALARMS	Active Alarms	Allows the user to view all current active alarms	Small & Large
	Display Setup	Change settings for display: language, time, simple or graphic view	Small & Large

Table 2 User menu icons *(continued)*

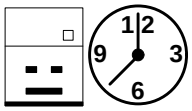
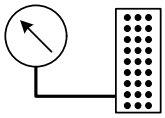
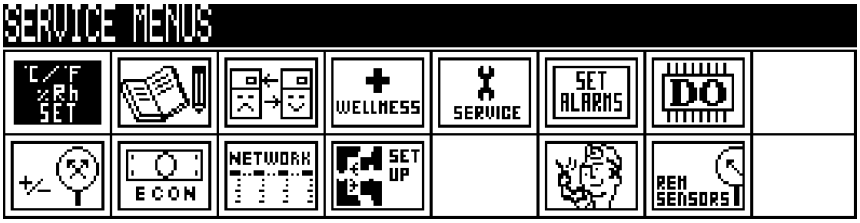
Icon	Name	Description	Available On Display
	Total Run Hours	Records the run time of all components and allows setting of limits on run time	Small & Large
	Sleep Mode	Allows setback settings for non-peak operation	Small & Large
	Service Contact Info	Contains key contact information for local service, including names and phone numbers	Small & Large
	Condenser Timer	Displays the timer settings for the Liebert MC™ (microchannel condenser)	Large

Figure 15 Service menu icons



Service Menu password: 5010

Table 3 Service menu icons

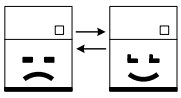
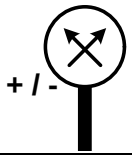
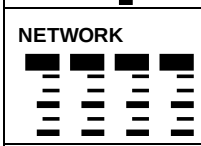
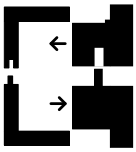
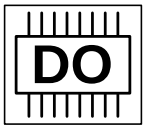
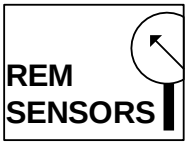
Icon	Name	Description	Available On Display
°C / °F % RH SET	Setpoints	To view and change temperature and humidity setpoints	Small & large
	Unit Diary	Shows all entered program changes and maintenance performed on the unit	Large
	Standby Settings/ Lead-Lag	Allows lead/lag setup when multiple units are connected	Small & large
 WELLNESS	Maintenance/ Wellness Settings	Allows setting maintenance interval reminder, maintenance message, number of unit starts and stops, and time since last maintenance	Small & large

Table 3 Service menu icons *(continued)*

Icon	Name	Description	Available On Display
	Diagnostics/ Service Mode	Allows troubleshooting, manual mode, read analog and digital inputs	Small & large
	Set Alarms	Allows enable, disable and settings for alarms	Small & large
	Sensor Calibration/Setup	Allows calibration of sensors	Small & large
	System/Network Setup	Allows setup and U2U communication for multiple units	Small & large
	Options Setup	Allows setup of component operation	Small & large
	Service Contact Info	Contains key contact information for local service, including names and phone numbers	Small & large
	Liebert iCOM-DO™	Change settings for Liebert iCOM Discrete Output card	Large
	Remote Sensors	Change settings for Remote Sensors	Large

3.0 OPERATION

The Liebert iCOM display provides viewing, trending and configuration capability for Liebert cooling units. All unit settings and parameters can be viewed and adjusted through three menus: User, Service and Advanced. All active alarms are displayed on the LCD and annunciated.

The control is shipped from the factory with default selections for all necessary settings. Adjustments can be made if the defaults do not meet your requirements.

References to menu items in this manual are followed by the main menu and the submenu where they can be found.

For example:

- **Temperature Setpoint (User Menu, Setpoints)** - The Temperature Setpoint parameter is located in the User menu under the Setpoints submenu.
- **High Return Humidity (Service Menu, Set Alarms)** - The High Return Humidity alarm is located in the Service menu under the Set Alarms submenu.

3.1 Single Unit Functions

3.1.1 Unit/Fan Control

Start - Stop

The fan output is first activated when the unit is switched On. The unit can be switched On and Off from two inputs:

- ALARM OFF—The unit has an alarm that has forced the unit to turn Off.
- MANUAL—Unit is being controlled by a service technician using the Service Diagnostics Manual Mode.
- LOCAL OFF—When a unit is turned Off from the Unit Status Screen or small display, LOCAL OFF is shown for unit status.
- DISPLAY OFF—When a unit is turned Off from the System Screen of a large display, Display OFF is shown for unit status.
- ALARM STANDBY—The unit has been rotated into standby because an active alarm on the unit is present.
- STANDBY—The unit is in standby based on the Lead / Lag settings in the Service Menu.
- TIMER OFF—The unit has been set to Sleep and is waiting for the next start interval. See User / Sleep Mode Menu.
- UNIT ON—The unit is operating normally without alarm or warning.
- WARNING ON—The unit has an active warning but is still operating. See User / Active alarms for details.
- ALARM ON—The unit has an active alarm but is still operating. See User / Active alarms for details.
- TIMER—The unit is configured on a timer to only operate at certain times. See User / Sleep Mode Menu.
- REMOTE OFF—Remote shutdown terminals will turn Off the connected unit and the front display shows REMOTE OFF as the status. This command can also be invoked from a BMS.
- MONITORNG OFF—In this case, an override to the monitoring is possible: Pressing the On-Off button of the display will change the state to Unit Off; pressing again may start the unit in Unit On. If the unit does not turn On, check the remote monitoring device or call 800-543-2778 for assistance.
- BACK-DRAFT—The unit is in a non-operational mode, but is operating the EC fan as a back-draft damper.

Pressing the On/Off key on a small display will affect only the cooling unit it is mounted on, regardless of whether the cooling unit is a stand-alone unit or part of a network. The small Liebert iCOM display does not have access to the Unit-to-Unit network.

NOTE

Pressing the On/Off key on a large display of a stand-alone cooling unit will control only that unit.

The effect of pressing the On/Off key on a large display connected to a network depends on the view: System or Unit.

- In System view, pressing the On/Off key shows a warning asking for confirmation to **shut down the entire system**.
- In Unit view, pressing the On/Off key affects only the unit being viewed, without a confirmation request.

Each time a unit is powered On or Off, an event is added to the Event Log in the User menu.

NOTE
Customer switches: remote On/Off (if used) and display On/Off switches are in series. A cooling unit will start only if both switches are On; if one of these switches is Off, the unit will stop. Safety devices within the unit are also in series and will shut the unit down if applicable.

Figure 16 Start-stop priority switches

NOTE
If Remote On/Off is not used, a jumper is inserted to bypass the switch.

Autorestart

When input power returns after a power failure, the unit will return to its previous operating status: On if it was On before the power failure, Off if it was Off.

When power returns, the autorestart time—time-selectable: Single Unit Auto Restart (Service Menu, Options Setup)—will determine how quickly the unit restarts.

Loss of Power Alarm

A Loss of Power Alarm is activated when power is restored after an interruption. If acknowledged, the alarm resets automatically after 30 minutes. This alarm can be set to different event types (Message, Alarm or Warning) and can be disabled under menu item Loss of Power (Service Menu, Set Alarms).

NOTE
Loss of Power alarm will be activated only on units that had the fan switched On before power was lost.

Fan Alarm / Fan Protection Settings

The fan operation is protected by two digital devices: motor protection (optional on VFD centrifugal and standard centrifugal drives) and a differential pressure switch. The motor protection monitors for main fan overload (Main Fan Overload alarm) or EC fan fault and the differential pressure switch detects a loss of airflow. If either protection device is activated after an adjustable time delay, an audible alarm occurs, an alarm relay activates and an event is recorded in the event log (Main Fan Overload or EC fan fault and Loss of Airflow in Service Menu > Set Alarms).

The fan delay at the unit start is always five seconds shorter than the control delay (to avoid short-cycling components when the fan is not working).

When a main fan overload occurs, the main fan, cooling, heating, humidification and dehumidification are disabled to prevent equipment damage; the unit status will show “Alarm Off.” The unit will automatically resume operation once the overload condition has cleared.

NOTE
When the Main Fan Overload EC fan fault alarm is active, the Loss of Airflow alarm is masked out.

When an EC fan fault occurs, the unit will continue to operate normally unless a loss of airflow alarm occurs.

When a loss of airflow occurs, the fan(s) will continue to operate to keep the unit on line until the problem is corrected. Cooling, heating, dehumidification and humidification are disabled.

Variable Speed Fans—EC or Variable Frequency Drives

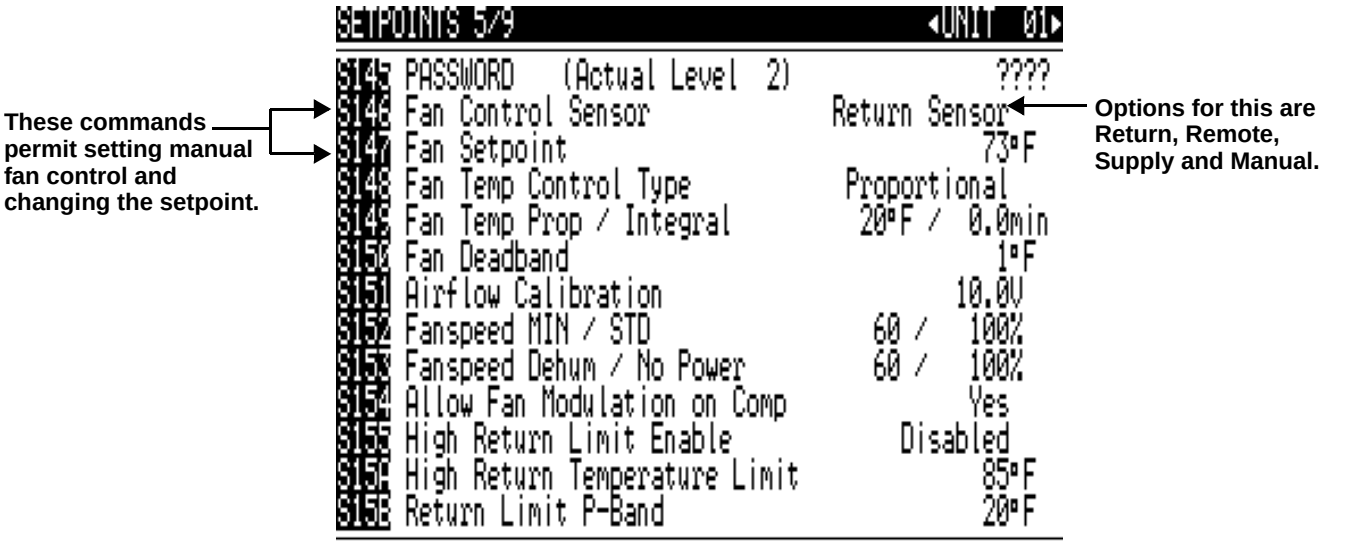
The Liebert iCOM control can adjust airflow manually through a BMS or dynamically using locally installed temperature sensors. Parameters related to VSD fan speed setting can be found in the Service Menu > Setpoints submenu on page 5 of 8. This menu allows the cooling unit's fan motor speed to be configured and adjusted for a variety of applications by selecting which sensor controls the fan speed.

Four fan control modes are available: Manual, Supply, Return and Remote. All units ship from the factory with the temperature control and fan speed control sensor set to the Return Air Sensor.

- **Manual Control**: When set to Manual, the speed of the fan motor follows user input as set either at the Liebert iCOM display or remotely through an optional Liebert IntelliSlot® card. See **6.0 - External Communication—Building Management Systems, Liebert SiteScan®** for more information regarding Liebert iCOM remote monitoring options.

  Before the building management system can control the fan speed, two parameters in the control control must be set. S146 “Fan Control Sensor” must read *Manual* and line S164 “Allow BMS to change Fanspeed” must be changed to *YES* at the Liebert iCOM. Both parameters are found in Service Menus > Service Setpoints.

Figure 17 Setting manual fan control and changing the setpoint


These commands permit setting manual fan control and changing the setpoint.
SETPOINTS 5/9
◂UNIT 01▸
S145 PASSWORD (Actual Level 2) ????
S146 Fan Control Sensor Return Sensor
S147 Fan Setpoint 73°F
S148 Fan Temp Control Type Proportional
S149 Fan Temp Prop / Integral 20°F / 0.0min
S150 Fan Deadband 1°F
S151 Airflow Calibration 10.0V
S152 Fanspeed MIN / STD 60 / 100%
S153 Fanspeed Dehum / No Power 60 / 100%
S154 Allow Fan Modulation on Comp Yes
S155 High Return Limit Enable Disabled
S157 High Return Temperature Limit 85°F
S158 Return Limit P-Band 20°F
Options for this are Return, Remote, Supply and Manual.

  Fan speed may be written through the building management system to line S152. The user can change this locally. However, if the speed is set by the BMS, it will override the local setting.

- **Supply, Return and Remote Control**: These selections allow fan modulation using an equipped return, supply or remote sensor; see **Table 4** for applicable control sensor combinations. If the fan control and the temperature control sensor have the same sensor selected, the control is considered coupled. If different sensors are selected, the control is considered decoupled. When operating the fan in coupled mode, the fan speed follows the call for cooling to reach the temperature setpoint. When the fans are operating in decoupled mode, the fans are ramped following the fan control band to achieve the fan setpoint.

Table 4 Controlling sensor settings

		S103 Temperature Control Sensor		
		Supply	**Remote Sensor**	**Return**
S125 Fan Control Sensor	Supply	Factory Default (Coupled)	N/A	N/A
	Remote Sensor	Recommended (Decoupled)	(Coupled)	N/A
	Return	(Decoupled)	(Decoupled)	(Coupled)

Minimum Fan Speed

Depending on the product control design, there may be an internal minimum speed, as defined by that specific product operation. Minimum fan speeds are defined below.

- Liebert DS™ units with pressure transducers 70%
- Liebert CW™ units 60 -100% (available option to 25%)
- Liebert Deluxe System\3™ units with low-pressure switches limited to 80%

  Contact your local Emerson dealer for more information if fan speed minimum settings must be lowered from the values above.

Additional fan speed configuration parameters include a fan speed filter and fan speed reposition delay timer. These parameters allow fine tuning the fan speed control and, except for setting to Manual, are applicable to any other operation mode set in the VSD fan speed setting.

- The fan speed filter allows the fan to respond at a different rate depending on the location of the control point within the proportional band.

  Example: When the controlled temperature is near the setpoint or at conditions where the proportional band output is decreasing and approaching 0%, the fan speed change rates are proportionally decreased to avoid overshooting the controlled temperature. However, when the temperature rises above the setpoint or at conditions where the proportional band output is increasing, the fan speed change rates are proportionally increased.
- The fan speed reposition delay timer setting in the Liebert iCOM menu may be changed to improve the fan operation stability if it is oscillating. The delay timer holds back the fan output change until each delay period is reached if fan speed is decreasing. If fan speed is increasing, then the delay timer has no effect.

NOTE

- *The fan speed lower and upper limit settings are set at the factory.*
- *The standard fan speed control will be overridden during a call for Dehumidification if the function is enabled. When there is a call for dehumidification, the fan speed will change to the VSD Setpoint Dehum parameter found in the Service Menu>Setpoints. This routine may be disabled in Service Menus>Options setup line S419.*
- *The standard fan speed control will be overridden during a call for humidification or reheat. During a call for humidification or reheat, the fan speed will change to a higher speed, which is set at the factory to eliminate the possibility of condensation or damage to the unit.*

Air Economizer with Variable Fan Speed Fans

An option in Service Menus > Setpoints > FC / AirEco Ramp Up w/CFC, allows the fan to ramp with Liebert Fluid Economizer. The default value is No, allowing the fan ramp independently of free-cooling. When set to Yes, the control will compare the call for fan to the free-cooling request. This will provide the most capacity from the Liebert Air Economizer and will help in holding off the mechanical cooling (second stage). When the Liebert Air Economizer is not available, the fan will still ramp with the first stage of cooling but the first stage will be either a chilled water valve or compressor operation.

NOTE

This feature is overridden in Manual fan control. Fan control must be in a decoupled mode.

3.1.2 Back-Draft Fan Damper—Units with EC Fans Only

The Liebert iCOM controller has the ability to operate EC fans at very low speed to effectively act as a back-draft damper. The power used to prevent air flow from entering a standby unit from the raised floor by spinning the fans at a low speed is much less expensive than the additional static that conventional mechanical dampers introduce while the unit is in operation.

Mechanical Fan Dampers

- No damper = Waste of efficiency, mixture of discharge and return
- Increase pressure drop during unit operation
- Up-front cost of mechanical dampers
- Increases unit height or adds complexity under floor

EC Fan Dampers

- Fans rotate at low speed to prevent air flow through unit
- Adjustable, based on application
- No pressure drop during unit operation
- No up-front cost as with mechanical dampers

Figure 18 Energy efficiency— Air bypass through unit, no mechanical damper

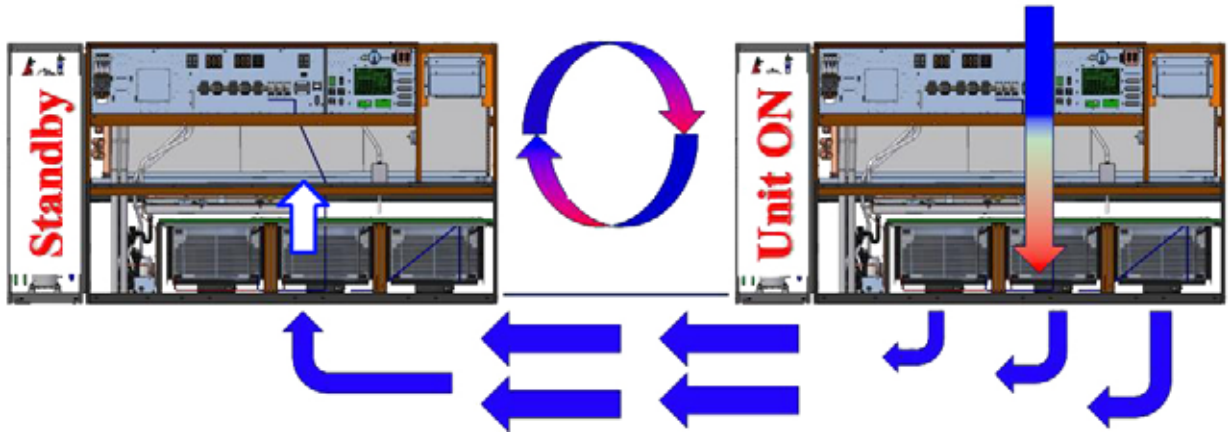
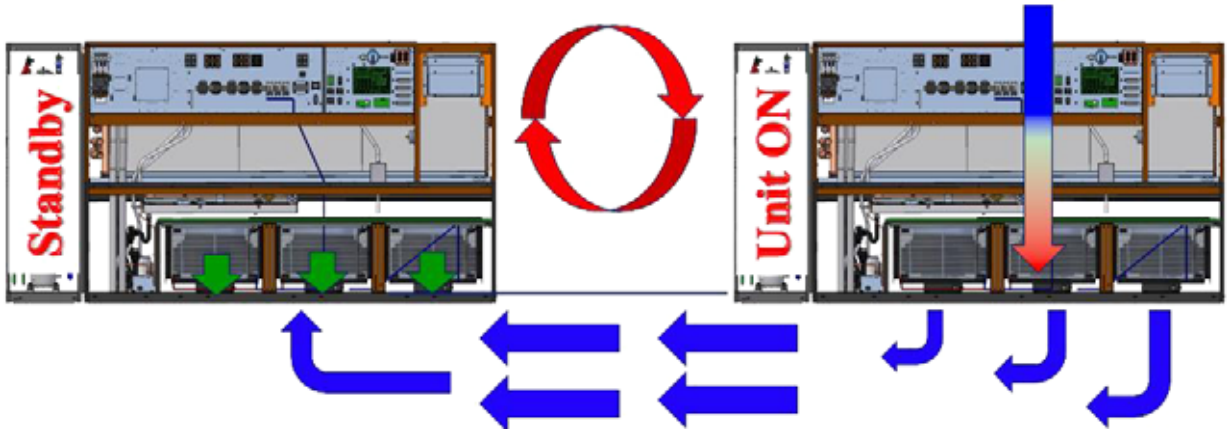


Figure 19 Energy efficiency—No bypass air, EC fan damper



3.1.3 General Compressor Requirements

Low-Pressure Time Delay

When the compressor starts, the low-pressure input is ignored for a selected period of time based on the setting of the Low Pressure Alarm Delay (Service Menu, Options Setup). This time is usually set to 3 minutes on air-cooled units, and to 0 or 1 minute on water cooled units. When this time is expired, a second timer starts to operate if the low-pressure input is active. This second timer is active during normal compressor operation to avoid compressor trips due to bubbles in the refrigerant or other influences creating short trips of the low-pressure switch. The low-pressure device input is ignored if the compressor is not operating. Exception: Pump Down (see **Pump Down**).

NOTE

Low-pressure condition could be read through contacts or through pressure transducers with threshold setting.

The advanced low pressure routine is automatically used when a unit is equipped with the Liebert iCOM controller, unloading compressors (4-Step and Digital Scroll), low-pressure transducers and has variable fan speed (VFD or EC fans). The low-pressure routine monitors the low-pressure transducers and interacts with the fan and compressor to prevent the units coil from freezing.

NOTE

Pressure transducers have been installed in all Liebert DS™ units. However, the Liebert Deluxe System\3™ units have all shipped with low-pressure switches, which cannot utilize the advanced freeze protection routine described above. Units equipped with switches have a higher minimum fan speed setting due to this limitation. A Liebert Deluxe System3 unit can be updated to pressure transducers as a field upgrade if lower fan speed settings are desired. To see the pressure readings, go to Service Menus > Diagnostics/Service mode, Page 1.

Advanced DX Freeze Protection

Applying fan speed to direct expansion systems generates the issue of how to avoid freezing condensate on the coil when the unit operates below 100% fan speed. Liebert iCOM's advanced freeze protection now provides the ability to predict freeze conditions and correct this condition automatically by adjusting the fan speed and compressor capacity.

Compressor Type Support

- Digital scroll (all sizes)
- Four-step (all sizes)
- No standard scroll support

Freeze Protection

- Fan and compressor will override sensors when freezing is detected
- Fan ramps up first, then compressor unloads

Pump Down

NOTE

The default setting for Pump Down is YES. The function is not available on all units. Emerson removed pump down control from Thermal Management products in 2011. Units shipped in 2011 and before may have pump down enabled.

Pump Down is applicable to compressorized systems that are equipped for pump-down operation, which is set at the factory. This operation prevents the compressor oil from being diluted with liquid refrigerant to ensure that the compressor is properly lubricated for the next startup.

The Pump Down operation operates in the following manner:

Whenever the control determines that no more cooling is required and a compressor needs to be shut Off, the liquid line solenoid valve (LLSV) is closed (de-energized). The compressor will continue to operate until the low suction pressure device (LPS or LPT) opens, which shuts Off the compressor. If the LP device does not open within a specified time, the LLSV is turned On, then back Off (the assumption is that the LLSV is stuck). If, after three times, the LP device does not open, the compressor and LLSV are locked Off and an alarm "Pump Down not completed" will appear.

There is a re-pump down if the LP device opens again after the compressor has been already stoppered maximum of six re-pump-down cycles per hour are allowed. At the seventh request of re-pump down, the alarm "Comp 1 Pumpdown Fail" or "Comp 2 Pumpdown Fail" will appear and the compressor will be locked out.

Pump down is always performed loaded (for compressors with unloaders: unloaders Off, digital scroll: control solenoid valve disabled).

For digital scroll only: when pump down has finished successfully (LP device opened), pump down will be continued for another half-second with the control solenoid valve energized.

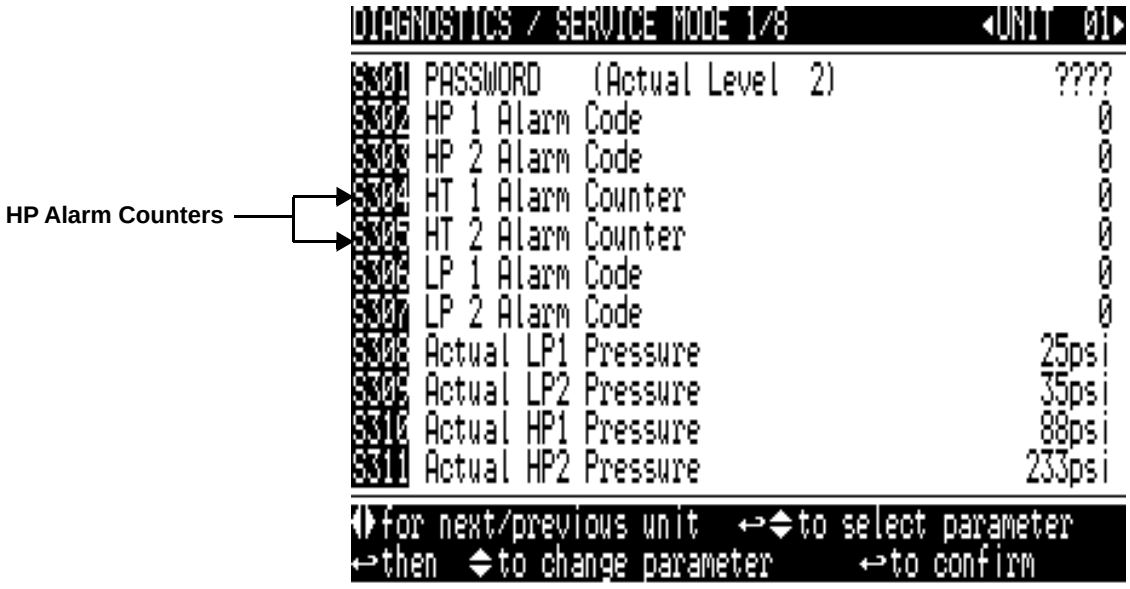
High Pressure Alarm

When the compressor is initially activated, the system will be monitored for a high pressure situation. When a high pressure situation is detected during the first 10 minutes of operation, the unit will attempt to correct the problem several times without notification. If the unit is unsuccessful in correcting the problem, an alarm will occur and the affected compressor will be locked Off. If high head pressure alarm trips three times in a rolling 12 hour period, the affected compressor will be locked Off.

After the compressor has been running for 10 minutes, if a high head pressure situation is detected, an alarm will occur and the affected compressor will be immediately locked Off without the unit trying to correct the problem.

Once the compressor is locked Off, it will not come back On until main power is reset or until the HP Alarm Counters (Service Menu, Diagnostics) are reset to 0.

Figure 20 Diagnostics/service mode screen, page 1 of 8


HP Alarm Counters
DIAGNOSTICS / SERVICE MODE 1/8
UNIT 01
S301 PASSWORD (Actual Level 2) ????
S302 HP 1 Alarm Code 0
S303 HP 2 Alarm Code 0
S304 HT 1 Alarm Counter 0
S305 HT 2 Alarm Counter 0
S306 LP 1 Alarm Code 0
S307 LP 2 Alarm Code 0
S308 Actual LP1 Pressure 25psi
S309 Actual LP2 Pressure 35psi
S310 Actual HP1 Pressure 88psi
S311 Actual HP2 Pressure 233psi
for next/previous unit ↵ to select parameter
↵then to change parameter ↵to confirm

Setting the counter to 0 will auto-reset the alarm without the need of pressing the reset button on the display. Even if the pressure in the system drops below the alarm point, the compressor will remain Off until the system is reset.

NOTE

If the unit is equipped with manual reset high head pressure switches, or if the auto reset high head pressure switches don't reset, the compressor will not be turned back on, but there will be a 30-second delay from when the high head pressure situation occurs and when the alarm is annunciated.

Digital Scroll High Temperature

A protective maximum operating compressor temperature limit is imposed on units with digital scroll compressor(s) with thermistor. If the digital scroll temperature reaches the maximum temperature threshold, the compressor will be locked out for at least 30 minutes and an alarm will be annunciated. If after 30 minutes the temperature has cooled to a safe operating temperature, the compressor will resume operation.

Each time a high-temperature alarm occurs, HT 1 Alarm Counter (Service Menu, Diagnostics) or HT 2 Alarm Counter (Service Menu, Diagnostics) is increased by one. Once these counters reach five occurrences in a rolling four-hour period, the compressor will be locked out. The alarm can be reset once the temperature returns to a safe level by:

1. Setting the counter back to 0 from the display and pressing the alarm reset button.
2. Shutting Off power to the control board by turning the cooling unit's main power disconnect switch Off and On.

3.1.4 Compressor Timing—Short-Cycle Protection

To help maximize the life of your compressor(s), there is a start-to-next start delay for each single compressor.

NOTE

*This delay may cause a short cycle if there is a very light room load. A short cycle means that the compressor has cycled On and Off 10 times in the past hour. This is typically caused by a lack of load or control settings set too tight (see **3.7 - Control Types** for more information on the control adjustment). Should short cycling still occur after the control has been adjusted, contact technical support at 800-543-2778 to adjust the minimum compressor Off delay.*

3.1.5 Compressor Sequencing on Two-Compressor Units

Compressor Sequencing parameter (Service Menu, Options Setup) is intended to maintain equal run times between compressors. This setting has three selection possibilities:

- Always use Compressor 1 as lead compressor.
- Always use Compressor 2 as lead compressor.
- Auto:
  - First priority: if the safety timings are acceptable for only one compressor, then it is the next to be started/stopped.
  - If both compressors are Off: the one with fewer working hours is the next to start.
  - If both compressors are in operation: the one that has been operating longer since the last start is the next to be stopped.

NOTE

The Auto setting attempts to maintain equal run times between compressors. However, the control will not turn Off a compressor to equalize run time when it is needed to control the space.

3.1.6 Motorized Ball Valve in Water-Cooled Units

On water/glycol-cooled units with digital scroll compressors), pressure changes during each digital cycle during unloaded operation. This rapid pressure change would cause a conventional water regulating valve to open and close an excessive number of times.

Excessive valve cycling is avoided on units with digital scroll compressors) by monitoring a liquid line transducer and regulating heat exchanger fluid flow with a motorized ball valve (MBV). The control algorithm for the motorized ball valve uses an intelligent sampling rate and adjustable pressure threshold (S427 Ball Valve Setpoint Offset in **Figure 160**) to reduce the number of times the valve opens and closes. System reliability and performance is enhanced using a brass valve, linkage and actuator.

Each compressor has one motorized ball valve that is driven by the analog output of the Liebert iCOM based on discharge pressure. If there is a call for cooling, the compressor start is delayed by a 30-second timer. During this delay, the motorized ball valve is set to 50% open to allow fluid flow through the unit condenser. The compressor will start after the 30-second timer elapses.

Motorized Ball Valve Manual Mode: (Service/Service, **Figure 126**) Manual operation can be selected to allow service personnel to control the motorized ball valve from the Liebert iCOM.

When Auto BV Control is selected, the motorized ball valve functions as it would be during normal system operation.

NOTE

Compressor operation will be delayed 30 seconds to allow the motorized ball valve to position itself for initial startup.

When Manual BV Control is selected, the user must be careful in setting the MBV position because the ball valves will remain in the position set in the Service menu until the control is switched back to Auto or until a technician changes the valves to another manual position (the motorized ball valve in manual mode can be set in 1% increments from fully closed to fully open). Low- or high-discharge pressure may occur during this mode, depending on environmental conditions and the position of the motorized ball valve.

The motorized ball valve is driven by a 2-10VDC proportional control signal: the valve is closed at 2VDC, 50% open at 6VDC and fully open at 10 VDC.

3.1.7 MBV Operation After Compressor is Turned Off

Once a compressor has stopped, the MBV control will continue to change the MBV position to maintain system pressures for a maximum time of 10 minutes by following the Auto BV control algorithm. When the 10-minute delay has expired or the discharge pressure is below its minimum threshold, the motorized ball valve will close until the next compressor activation.

3.1.8 Service Offset—Changing System Pressure Settings

The MBV control is set to maintain a system pressure specific to the particular type of cooling unit. A properly trained and qualified technician can increase or decrease the pressure through the Ball Valve Setpoint Offset found in the Service/Options Setup menu. The range is 0 to 50 PSI; the default is 30 PSI.

NOTE

Adjusting this parameter will increase or decrease the operating compressor discharge pressure by changing the targeted range of control. The discharge pressure is the peak pressure of the digital cycle.

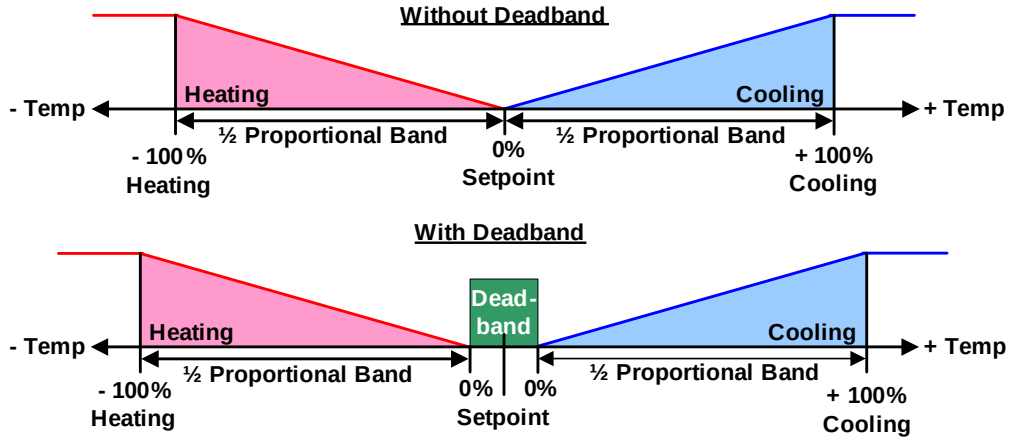
3.2 Temperature Control—Single Source Cooling (No Extra Cooling Coil)

3.2.1 Temperature Proportional Band

The control uses the temperature proportional band to determine which operation to perform (cooling/heating) and how much capacity to provide. The Temperature Proportional Band is a user-defined range that is divided into two equal parts for cooling and heating. The Temperature Setpoint is between these two equal parts.

An optional Temperature Deadband range can be defined, which is equally divided on either side of the setpoint and separates the two halves of the proportional band. **Figure 21** illustrates how the temperature proportional band is evenly divided on either side of the temperature setpoint, with and without a deadband.

Figure 21 Temperature proportional band



The control works the same for both supply or return air control. When air temperature deviates from the setpoint, the control will bring on cooling or heating. If the actual air temperature increases, the control calls for 0% (none) to 100% (full) cooling capacity based on how much the temperature exceeds the setpoint. If the return air temperature decreases, the control calls for 0% to -100% (none to full) heating capacity based on how far the temperature is below the setpoint.

When the return air temperature reaches the end of the proportional band, either 100% or -100%, full cooling or full heating capacity is provided. No operation is performed when a 0% call is calculated or the temperature is within the deadband. The control varies the call for cooling and heating in 1% increments as the air temperature moves through the proportional band halves.

The deadband range is used to widen the setpoint. When the air temperature falls within the deadband, the control operates the same as if the temperature equaled the setpoint exactly. This setting helps maximize component life by preventing excessive component cycling.

NOTE

The temperature deadband prevents small temperature changes from activating compressors and valves.

The Temperature Proportional Band and Temperature Deadband parameters are in the Service menu under the Setpoints submenu. The Temperature Setpoint parameter is in both the User Menu and Service Menu under Setpoints.

There is a parameter AutoSet Enable (Service Menu, Setpoints) that automatically sets the proportional bands for temperature and humidity, and both the integration time factors according to the type of unit (chilled water, single or dual compressor).

NOTE

When the proportional or integral setpoints are changed, the Auto Set Enable must be changed to NO. Do not put Auto Set back to YES after altering the control bands.

3.2.2 Compressor Control

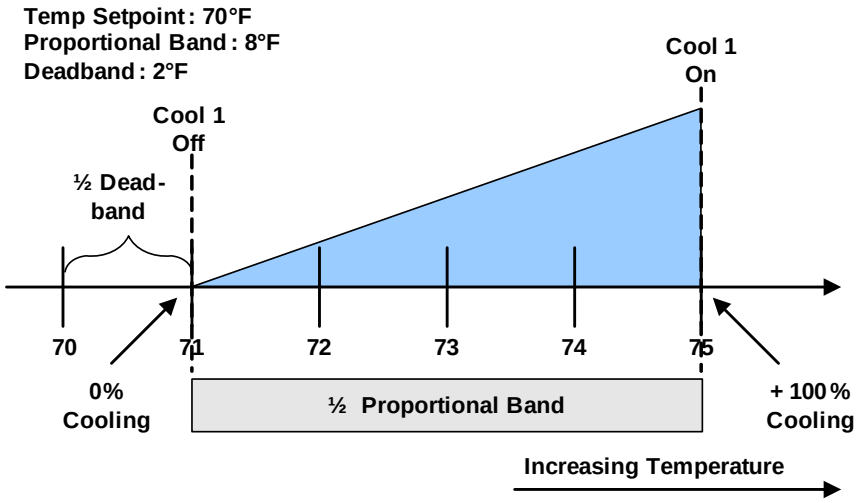
Depending on its type, a Liebert cooling unit may have one or two compressors with or without unloaders or variable capacity.

Compressor Proportional Bands

One Single-Step Compressor Without Unloaders—One-Step

One single-step compressor, Cool 1, is started at 100% call for cooling from the temperature proportional band and stopped at 0% (see **Figure 22**).

Figure 22 One single-step compressor without unloaders



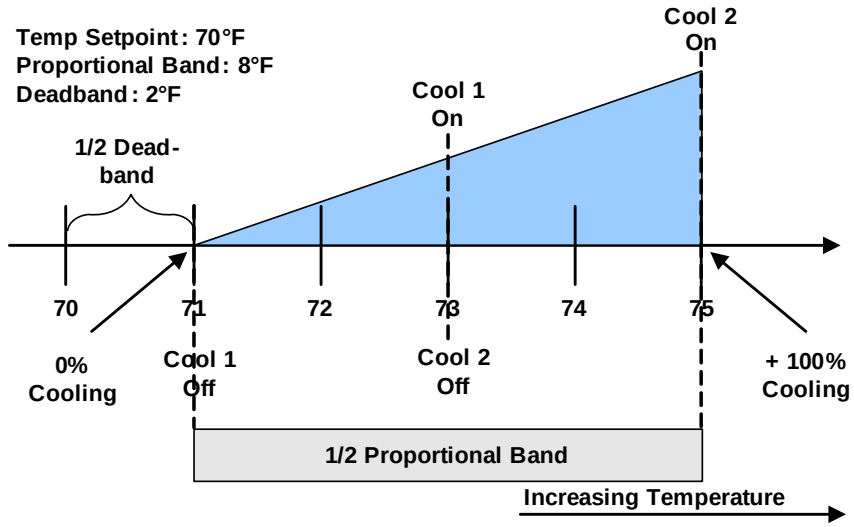
Two Single-Step Compressors Without Unloaders—Two-Step

First single-step compressor, Cool 1, is started at 50% calculated output from the temperature proportional band, and stopped at 0%. The second compressor, Cool 2, starts at 100% and stops at 50% (see **Figure 23**).

One Compressor With an Unloader—Two-Step

The two-step compressor is started unloaded at 50%, Cool 1, calculated output from the temperature proportional band and stopped at 0%. At 100% the compressor starts fully loaded, Cool 2, and returns to unload operation at 50% (see **Figure 23**).

Figure 23 Two single-step compressors without unloaders or one compressor with an unloader (two-step)



Two Compressors With Unloaders—Four-Step

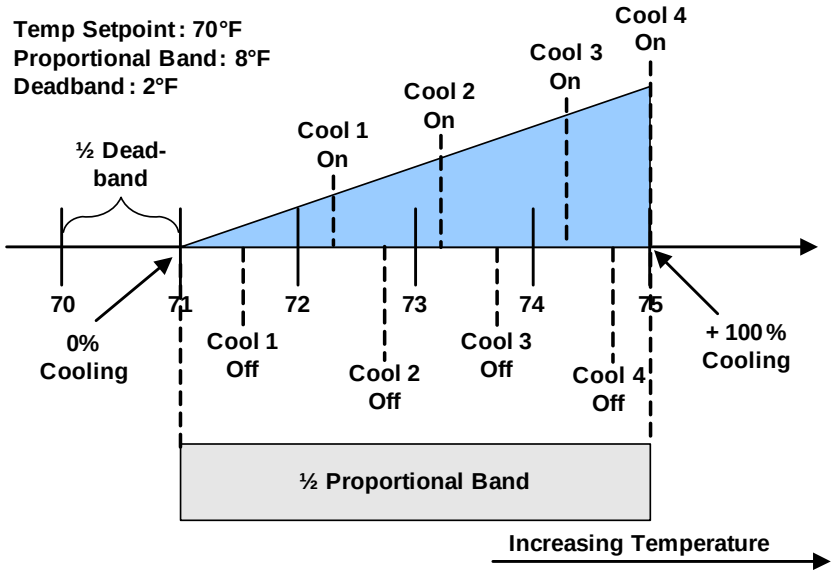
The first two-step compressor is started unloaded at 33% calculated output from the temperature proportional band and stopped at 17%. At 80%, Compressor 1 will be loaded, at 70% unloaded.

The second compressor starts unloaded at 63% and stops at 47%. At 100%, Compressor 2 will be loaded, at 90% unloaded (see **Figure 24**).

The four stages of cooling are accomplished in the following manner:

- 1 stage: One compressor, unloaded - Cool 1
- 2 stages: Both compressors, unloaded - Cool 2
- 3 stages: One compressor, loaded and one compressor, unloaded - Cool 3
- 4 stages: Both compressors, loaded - Cool 4

Figure 24 Two compressors with unloaders (four-step)

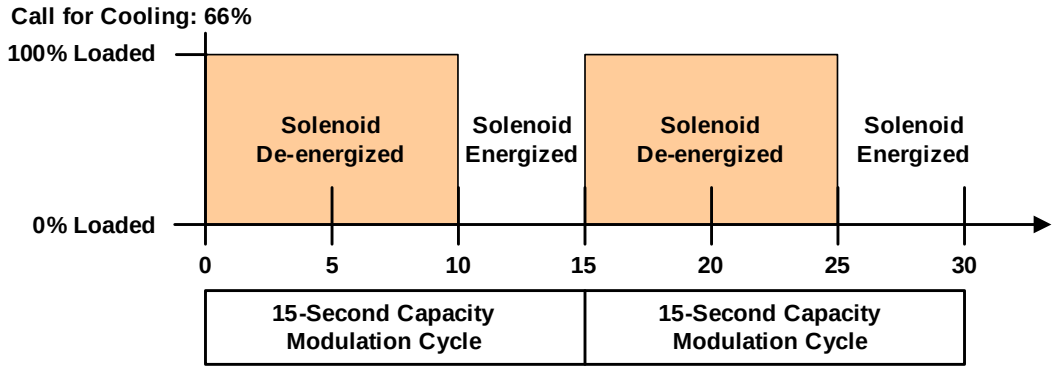


Digital Scroll Compressors

A digital scroll compressor can modulate its capacity anywhere between 10-100%. This variable capacity modulation allows cooling units to control an environment more precisely.

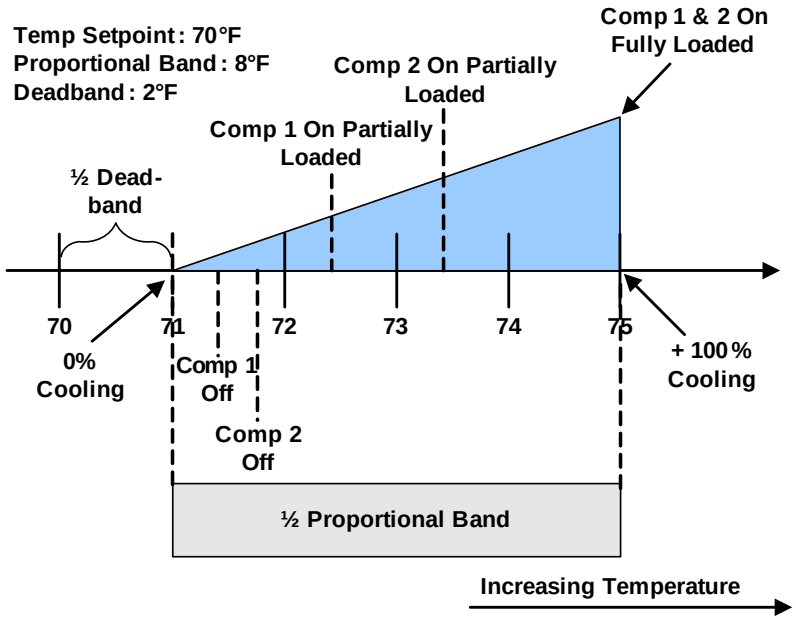
Digital scroll capacity modulation is achieved by energizing and de-energizing a solenoid valve on the compressor. When the solenoid valve is de-energized, the compressor capacity is 100%. When the solenoid valve is energized, the compressor capacity is zero. Therefore, the capacity of the compressor depends on how long the solenoid is de-energized for. If the solenoid is de-energized for 10-seconds, then energized for 5 seconds during a 15-second cycle, the resulting capacity will be 66% as shown in **Figure 25**.

Figure 25 Digital scroll capacity modulation, 10-100% variable



On single and dual digital scroll compressor systems, the first compressor is started at 25% calculated output from the temperature proportional band and stopped at 10%. On dual digital scroll compressor systems, the second compressor is started at 35% and stopped at 20%, see **Figure 26**. When a compressor is started, the solenoid is energized longer than it is de-energized to match the call for cooling. When the call for cooling increases to 100%, the solenoid is de-energized for the entire 15 second cycle.

Figure 26 Single and dual digital scroll compressor activation points



3.2.3 Chilled Water Control

The chilled water control valve is adjusted proportionally as the temperature control varies the requirement for cooling from 0% to 100%. A three-point actuator or motorized ball valve is used for chilled water cooling, as well as free-cooling hot water or heating.

The three-point actuator is driven through two digital outputs: Open and Close. The control determines the valve position by timing how long the open or closed signals have been active based on the valve travel time set in the Service menu / Setup submenu. To determine the initial position of the valve, the unit must perform a 3P Reset. The 3P Reset closes the valve for a time of 110% of the 3P Actuator run time. This calibrates the valve with the controller and ensures that it is closed. A 3P Reset is also performed if the fan is switched Off for any reason (timer Off, unit Off, etc.). Once the reset is performed, the three-point actuator can be configured to utilize the pre-wired feedback signal provided from the factory. Enabling the feedback signal will eliminate the need to drive the valve closed after a loss of power or Unit Off command, decreasing the unit's restart time.

Valve feedback is available only on Liebert CW models; feedback is not compatible on units with fluid economizer.

Authorized Emerson personnel should use the following steps to enable the feedback signal:

1. Turn unit Off at the display.
2. Shut Off input power at the main disconnect.
3. The feedback on the control valve uses Analog Input 1.
4. Nothing can be connected to Analog Input 1 P11 pins 1 through 4.
5. Control board DIP switch SW2 Switch 1 must be ON, Switch 2 must be OFF.

Figure 27 DIP switch locations on Liebert iCOM control board

6. P68 must have a jumper placed between the top and bottom two pins on the left side and one placed between the top and bottom pins on the right side, the two middle pins should be left unconnected.
7. Go to Service/Diagnostics Service Menu and find S379. Set this option to Feedback and note that S380 will go to Yes and S381 will go to Ongoing. If Feedback is already selected, then go to line S380 and manually select Yes. This means that the Liebert iCOM is doing auto calibration on the valve using the feedback now available through the potentiometer. Wait for S381 to say *Idle* and then the process is complete.

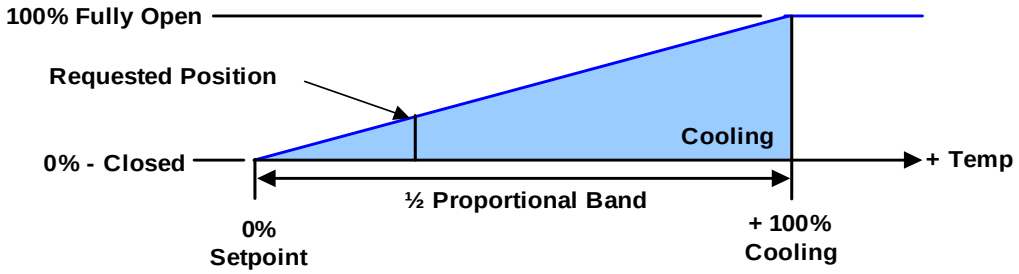
Chilled water units that contain a motorized ball valves) are connected to the control by an analog output. The analog output is driven proportionally to the call for cooling as shown in **Figure 28**. Larger chill water units may contain two motorized ball valves in which both valves are controlled in parallel for cooling. The two valves may be set to Cascade mode for dehumidifying to minimize the overcooling effect during dehumidification.

8. Turn the unit On at the Liebert iCOM.

NOTE

Depending on the valve specifications, the voltage output may be a 0-10VDC or a 2-10VDC that is scaled automatically within the control.

Figure 28 Chilled water valve control (example: cooling)



3.3 Temperature Control—Second Cooling Source

Two types of secondary source cooling models are offered, GLYCOOL and Dual-Cool. GLYCOOL models are two-pipe systems. This means that two pipes enter the unit and feed the chilled water/free-cooling coil as well as the compressor(s) heat exchanger (eg., Liebert Paradenser™, tube-in-tube condenser or brazed plate heat condenser). Dual-Cool units can be two-pipe or four-pipe. A two-pipe unit has two fluid lines dedicated to the secondary cooling source, and the compressor(s) heat rejection is an air-cooled condenser. Four-pipe Dual-Cool models have two fluid pipes dedicated to chilled water/free-cooling and two pipes for the compressor(s) heat exchanger. Each model offers a primary DX source and a secondary chilled water or free-cooling coil.

3.3.1 Differential Temperatures / Controls (Comparator Circuit)

Delta T (Temperature Difference) Between Room and Fluid

The comparator circuit determines if the glycol / chilled water temperature of the second cooling source is low enough to provide at least partial cooling capacity. Free-cooling Fluid Temperature is controlled in the User - Sensor Data menu, **Figure 94**. The comparator circuit has four settings (DT Between Room / FC Type, [Service Menu, Setpoints]):

- Disabled
- Contact
- Value
- Set

The Disabled setting is for standard compressorized and chilled water units that do not have a second cooling source. The Disabled setting can also be used to disable the second source of cooling.

The Contact setting is used when an external input is being used to determine when the second cooling source is to be activated. The external control communicates to the Liebert unit via contact closure.

- Closed = activate second cooling source control
- Open = deactivate second cooling source control

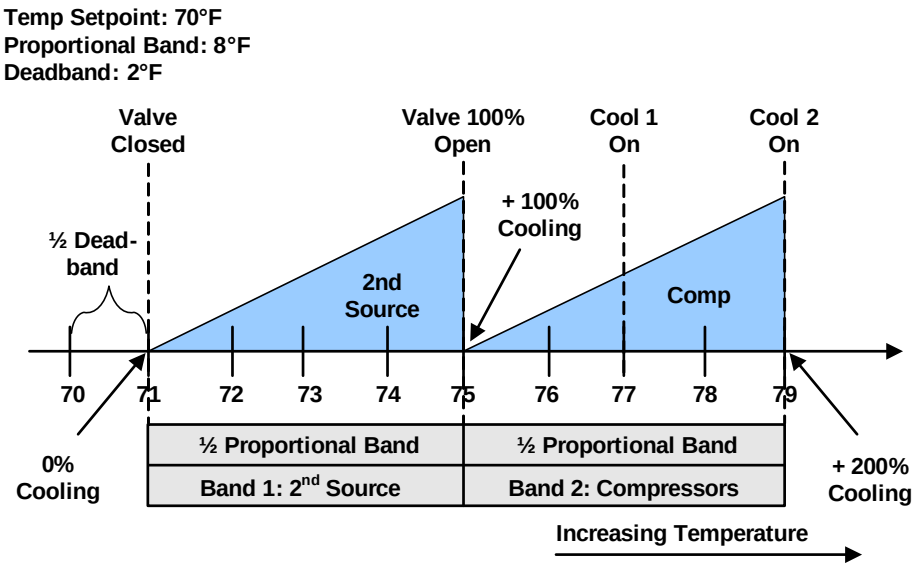
The Temp setting is the factory default setting (12°F [-11.1°C]) on free-cooling and dual cooling units. If the temperature difference between the second source cooling fluid parameter, Free-cooling Fluid Temperature (User Menu, Sensor Data) and room air is equal to or greater than the adjustable DT Between Room / FC Fluid (Service Menu, Setpoints) value, then the second source cooling fluid will be used to provide at least partial cooling.

The Set option allows free-cooling whenever the fluid temperature sensed (User Menu > Sensor Data) is colder than the temperature setpoint. The difference required between the temperature setpoint and the fluid temperature is adjusted on the following line DT2 Room / FC Fluid value (Service Menu, Setpoints). The second source cooling fluid will be used to provide cooling if the temperature difference between the second source cooling fluid parameter, Free-cooling Fluid Temperature and room air is equal to or greater than the adjustable DT Between Room / FC Fluid value.

Sensors used for this delta T are: room/local sensor or the return air sensor; and the glycol sensor.

If this delta T is true, the Free-cooling Status indication will show “On” instead of “Off”. The status is found in the User- Sensor Data menu, **Figure 94**. The primary and secondary source of cooling will stage accordingly. See the next sections for more information.

Figure 29 Second cooling source and two-step compressorized cooling



Minimum Chilled Water Temperature—This feature allows the user to select a minimum chilled water temperature to prevent simultaneous operation of the chilled water (free-cooling) and compressor(s) on units factory-programmed to operate both sources simultaneously. This feature is enabled in the Service menu under Setpoints, parameter Minimum CW Temp.

If the fluid temperature sensed is below the Minimum CW Temp Value, (Service Menu, Setpoints), and the Delta T (Temperature Difference) Between Room and Glycol (see **3.3.1 - Differential Temperatures / Controls (Comparator Circuit)** is satisfied, the control will operate ONLY the chilled water for cooling. The compressor(s) is locked out. If cooling is not achieved at this time (i.e., loss of chilled water flow), the control will override this setting and activate a compressor(s). When this happens, a free-cooling lockout for one hour event is produced. Free-cooling will not resume until one hour has elapsed.

If the fluid temperature is above the minimum CW value, the control will operate the chilled water (free-cooling) and compressor(s) simultaneously if needed. If the Minimum CW Temp is disabled, the control may operate both sources as load requires.

GLYCOOL™ Cooling—Free-Cooling

GLYCOOL units may be programmed to stage cooling components two ways.

- Operate free-cooling or compressor(s) to maintain temperature (factory default).
- Operate free-cooling and compressor(s) simultaneously.

Caution must be taken when operating free-cooling and compressor simultaneously on GLYCOOL units. Adequate flow must be provided to the unit to prevent high pressure when 100% free-cooling is required in addition to DX cooling. Running too cold of fluid temperature and compressor(s) simultaneously may cause refrigerant pressure to drop. Contact technical support at 800-543-2778 for more information on simultaneous operation setup.

When the unit is configured to operate free-cooling or compressors(s), free-cooling eligibility is based on the comparator circuit discussed in **3.3.1 - Differential Temperatures / Controls (Comparator Circuit)**. If the circuit determines free-cooling will condition the space, the valve will open and close as temperature deviates from the setpoint. If the comparator circuit determines that free-cooling is not capable of conditioning the space, control is automatically replaced by compressor(s).

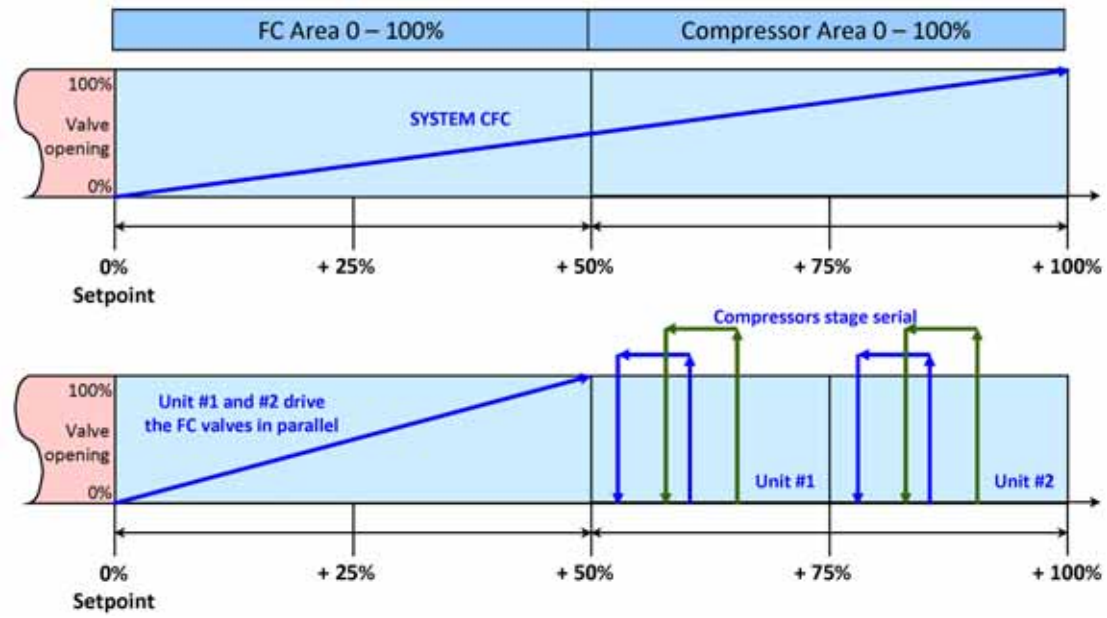
During either free-cooling or compressor operation, the control uses the temperature proportional band to determine which operation to perform (cooling/heating) and how much capacity to provide. The Temperature Proportional Band is a user-defined range that is divided into two equal parts for cooling and heating. The Temperature Setpoint is between these two equal parts. An optional temperature and heating deadband range can be defined, which is equally divided on either side of the setpoint and separates the two halves of the proportional band.

When the unit is configured to operate free-cooling and compressor(s) simultaneously, the comparator circuit determines free-cooling eligibility. Free-cooling and compressor(s) are staged based on temperature deviation from setpoint. The cooling proportional band is divided into two parts for simultaneous operation, the first portion is used for free-cooling and the second for DX operation. **Figure 29** illustrates how the cooling proportional band is broken out on a free-cooling unit with two step compressors.

Cooling Control Band for Simultaneous Operation = (Temperature Proportional Band/2) / 2 + (Temperature Deadband/2)

If the comparator circuit determines that free-cooling is ineligible for use, the compressor band will shift to the left.

Figure 30 Free-cooling and compressorized operation



Dual-Cooling Source

Dual-cooling systems operate in the same manner as a GLYCOOL system, except they are factory-configured to operate free-cooling and compressor simultaneously. If simultaneous operation is not desired, contact technical support at 800-543-2778 for assistance.

3.3.2 Outdoor Air and Return Air Temperature and Humidity Sensor Connections

The Liebert Air Economizer™ ships with sensors to determine the temperature and humidity of return air and outdoor air. The sensors and wiring to connect them are in boxes inside the Liebert Air Economizer:

- Outdoor air sensor
- Return air sensor
- Supply air thermistor (factory-connected to the main interface board)

These must be installed and connected to the primary cooling unit. The outdoor air sensor and return air sensor connections for the Liebert DS™ and Liebert CW™ are shown in **Figure 31**. Connect the supply air thermistor as shown in **Figure 32** (it must be routed from the cooling unit and secured). The illustration shows connections for the Liebert DS and Liebert CW.

NOTICE

Turn Off all power to the indoor cooling unit before connecting cables or wires. Failure to do so may damage this equipment.

Figure 31 Temperature and humidity sensor connections—Liebert DS and Liebert CW

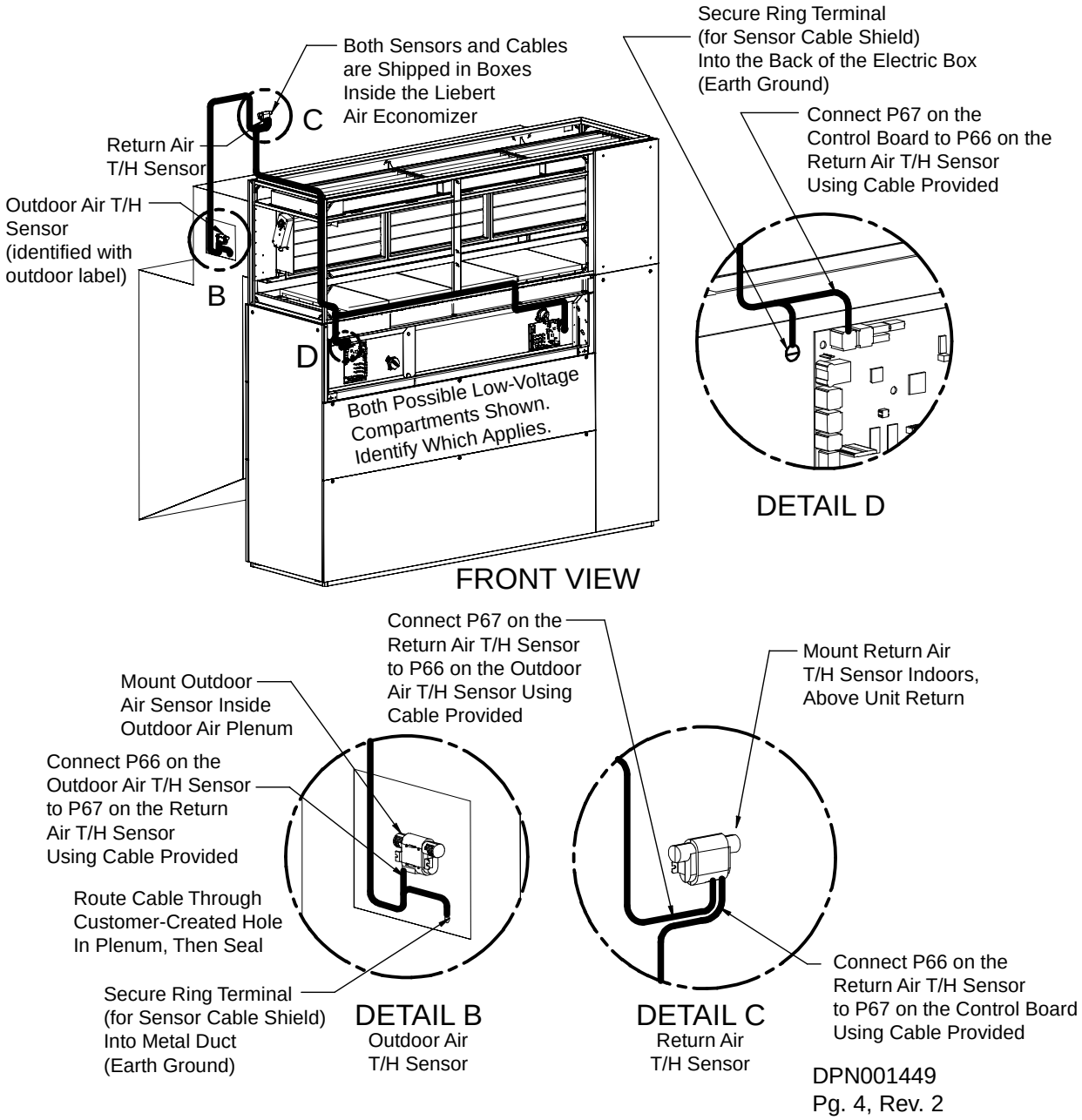
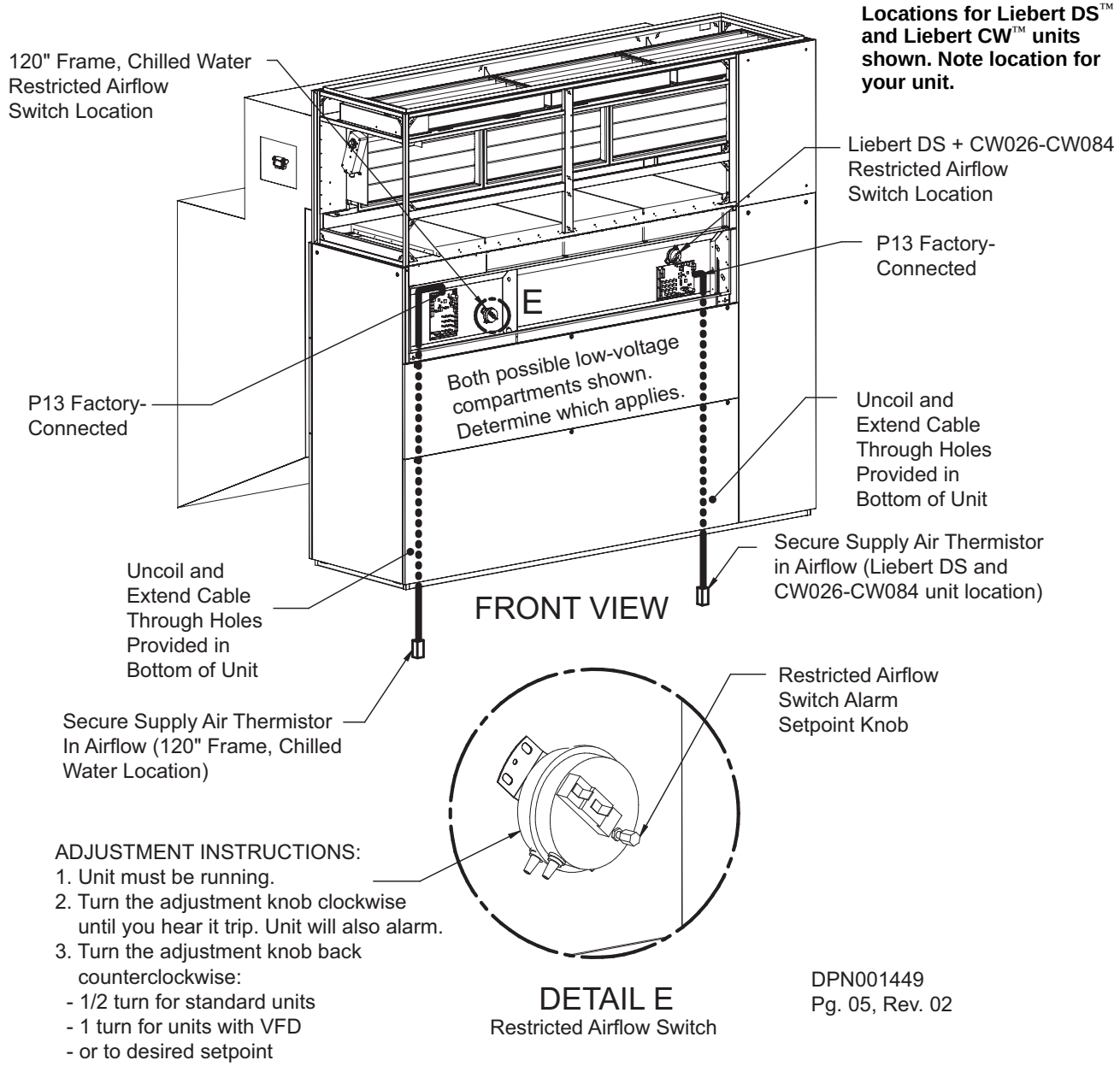


Figure 32 Supply limit thermistor wiring and restricted airflow switch location


Locations for Liebert DS™ and Liebert CW™ units shown. Note location for your unit.
120" Frame, Chilled Water Restricted Airflow Switch Location
Liebert DS + CW026-CW084 Restricted Airflow Switch Location
P13 Factory-Connected
E
Both possible low-voltage compartments shown. Determine which applies.
P13 Factory-Connected
Uncoil and Extend Cable Through Holes Provided in Bottom of Unit
Secure Supply Air Thermistor in Airflow (Liebert DS and CW026-CW084 unit location)
FRONT VIEW
Uncoil and Extend Cable Through Holes Provided in Bottom of Unit
Secure Supply Air Thermistor In Airflow (120" Frame, Chilled Water Location)
Restricted Airflow Switch Alarm Setpoint Knob
ADJUSTMENT INSTRUCTIONS:
1. Unit must be running.
2. Turn the adjustment knob clockwise until you hear it trip. Unit will also alarm.
3. Turn the adjustment knob back counterclockwise:
- 1/2 turn for standard units
- 1 turn for units with VFD
- or to desired setpoint
DETAIL E
Restricted Airflow Switch
DPN001449
Pg. 05, Rev. 02

3.3.3 Adjust the Restricted Airflow Switch on the Liebert Air Economizer™

The restricted airflow switch inside the cooling unit must be adjusted for the Liebert Air Economizer to operate properly and efficiently. To adjust the switch:

1. Inspect all connections, restore power to operate the unit's blower.
2. Go to the Service Menus, Diagnostic / Service Mode.
3. Enter the Service Menu password **5010.**
4. Enable manual mode on line S313. The unit will shut Off.
5. Go to line S314 Motors and change the value displayed from No to Yes. This will allow the evaporator fan to run with the outside air damper at minimum position.
6. Confirm the fan is running at minimum speed. This is shown on line S343 "Analog Out 3" of the Diagnostics / Service Mode.
7. Confirm the outside air damper has moved to the minimum position by visually checking damper position.
8. Find the restricted airflow switch in the cooling unit (**Figure 32** shows the switch location in both the Liebert CW™ and Liebert DS™).
9. Turn the restricted airflow switch alarm setpoint knob clockwise until it trips. The cooling unit will also alarm.
   a. Place a voltmeter on Terminal 56 and on the chassis ground.
   b. Turn the airflow sensor counterclockwise until the voltmeter indicates 0VAC.
   c. Turn the airflow sensor adjustment screw clockwise until the voltmeter indicates 24VAC.
   d. When the voltmeter shows 24VAC, turn the screw counterclockwise one full turn.

Once the airflow switch has been calibrated, go to the Service Menus, Diagnostics / Service Mode. Using the Service Menus password 5010, disable manual mode on line S313.

The reduced airflow alarm is latched in the control for 90 minutes after calibration. Acknowledge this alarm and allow it to clear by pressing the horn button on the control once. The alarm may also be cleared by shutting Off power to the Liebert iCOM and cycling power to the cooling unit. The unit will now resume normal operation.

3.4 Liebert Air Economizer™ Operation

Liebert cooling units control the Liebert Air Economizer with the analog outputs of the Liebert iCOM control. The Liebert iCOM can be used with a Liebert Air Economizer or with a previously installed Liebert Air Economizer equipped with 0-10VDC or 2-10VDC dampers. The Liebert iCOM is capable of driving two independent damper motors or can be set up through the software to output a single signal where the dampers are inversely driven.

The primary cooling unit responds to sensors that monitor the temperature and humidity of the outdoor air, return air and supply air. If outdoor conditions are within the tolerances set, the primary cooling unit opens the Liebert Air Economizer's dampers varying amounts to use outdoor air for cooling. When outdoor conditions are too warm or humid for cooling, the primary cooling unit closes the Liebert Air Economizer's dampers, taking it out of the cooling process.

NOTICE

Risk of high or low humidity. Can cause environmental conditions that are outside equipment requirements.

While the Liebert Air Economizer is operating, the primary cooling unit's humidification and dehumidification are inhibited. If humidity level is important to operational requirements, it must be controlled by other methods during operation of the Liebert Air Economizer. While the primary cooling unit is cooling without the Liebert Air Economizer, the primary cooling unit will control humidity levels according to its setpoints.

NOTICE

Risk of freezing temperatures. Can cause equipment and property damage.

Low outdoor temperatures can produce freezing conditions that adversely affect cooling systems employing water, particularly when the water is not moving through the pipes. When cooling system water is not moving, frozen waterlines, burst coils and water damage are possible. The outside damper must be set so that it is fully closed when freezing temperatures are possible and the cooling system is not operating (see **3.4.4 - Disable the Liebert Air Economizer™**). This can be achieved by either connecting a freeze stat that interrupts the economizer signal or by wiring a freeze stat directly into the Liebert iCOM's customer input.

The risk of freezing is increased unless the proper amount of glycol is added to the chilled water unit loops.

NOTICE

Risk of infiltration of odors, smoke and particulates from outside air. Can cause environmental conditions that are outside equipment requirements.

The Liebert Air Economizer does not remove odors, smoke, gases or particulates from the outside air used for cooling. These must be controlled by other methods.

3.4.1 Liebert Air Economizer Operational Condition

Normal Operation

When the Liebert Air Economizer is being used for cooling, both the outside air damper and the room return air damper are active in an opposing relationship. The cooling requirement and temperature of the outdoor air will determine the position of the outside air damper. It will range from fully closed to fully open. As the outside air damper moves toward fully open, the return air damper will close to a minimum of 15%. The 15% minimum is to make sure that air remains circulating near the return air sensor. If the return air sensor is moved to another position where there is constant circulation of air in both outdoor and indoor modes, then the minimum 15% indoor damper position can be removed.

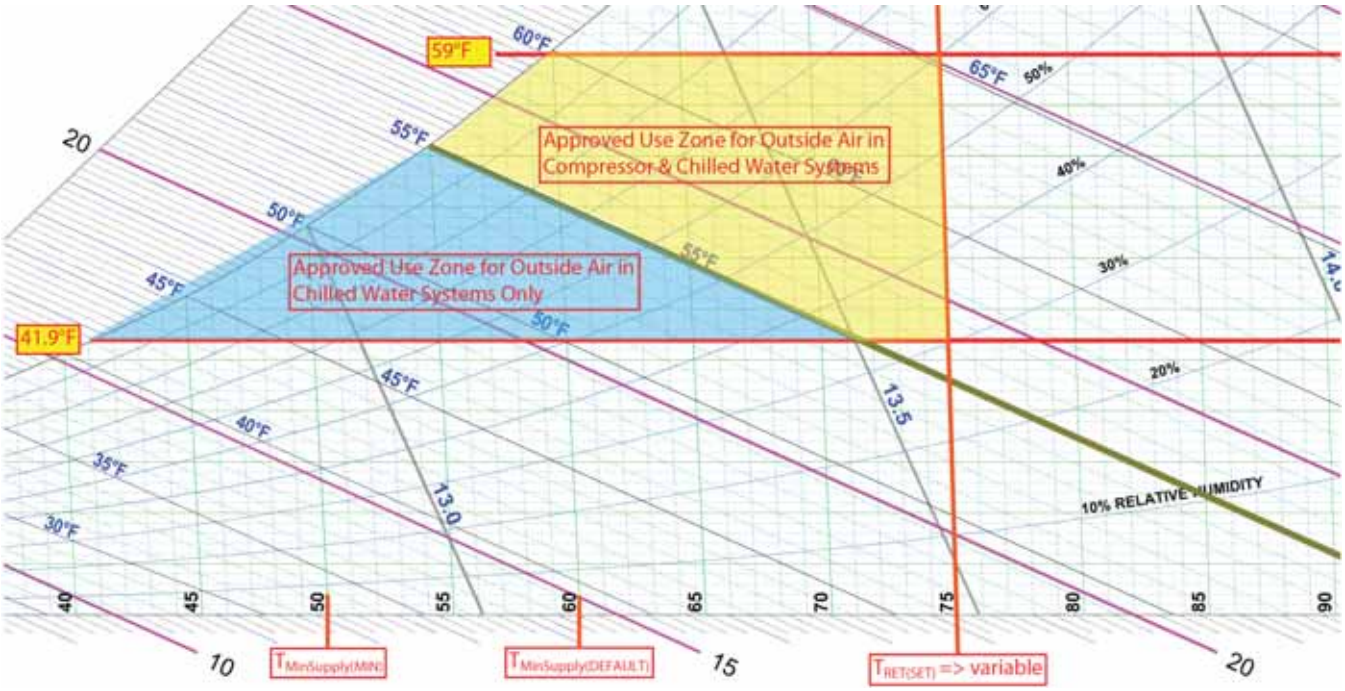
NOTICE

Risk of improper operation. Can cause degraded cooling and ventilation operation because of improper building air pressure.

The incoming air from the outside damper requires expelling an equal volume of air through a field-provided powered relief air vent. The volume that must be expelled will vary from 0 to 80% of the total airflow for all Liebert Air Economizer™ units. The powered relief system should be sized for 80% of the total airflow for all Liebert Air Economizer units in the conditioned space and to maintain minimal building air pressure.

Figure 33 Operational ranges for chilled water systems and compressor systems

Operation range is based on ASHRAE 90.1



3.4.2 Liebert Air Economizer™ System Overview

Controller settings will vary depending on the application. The objective of all settings is the same: to expel warm air from the conditioned space and bring in cooler air through the Liebert Air Economizer. This function is monitored continuously by the Liebert iCOM that controls the Liebert Air Economizer.

Figure 34 shows an example of the air flow pattern of a Liebert Air Economizer system. The indoor sensor must be positioned where there is airflow when the system is in full economizer operation and when the system is operating in non-economizer mode.

If the indoor damper position has been changed to 0% from the factory default of 15%, then the indoor sensor must be moved, preferably to the hot aisle.

Figure 34 Air flow pattern of a Liebert Air Economizer system-regular ceiling

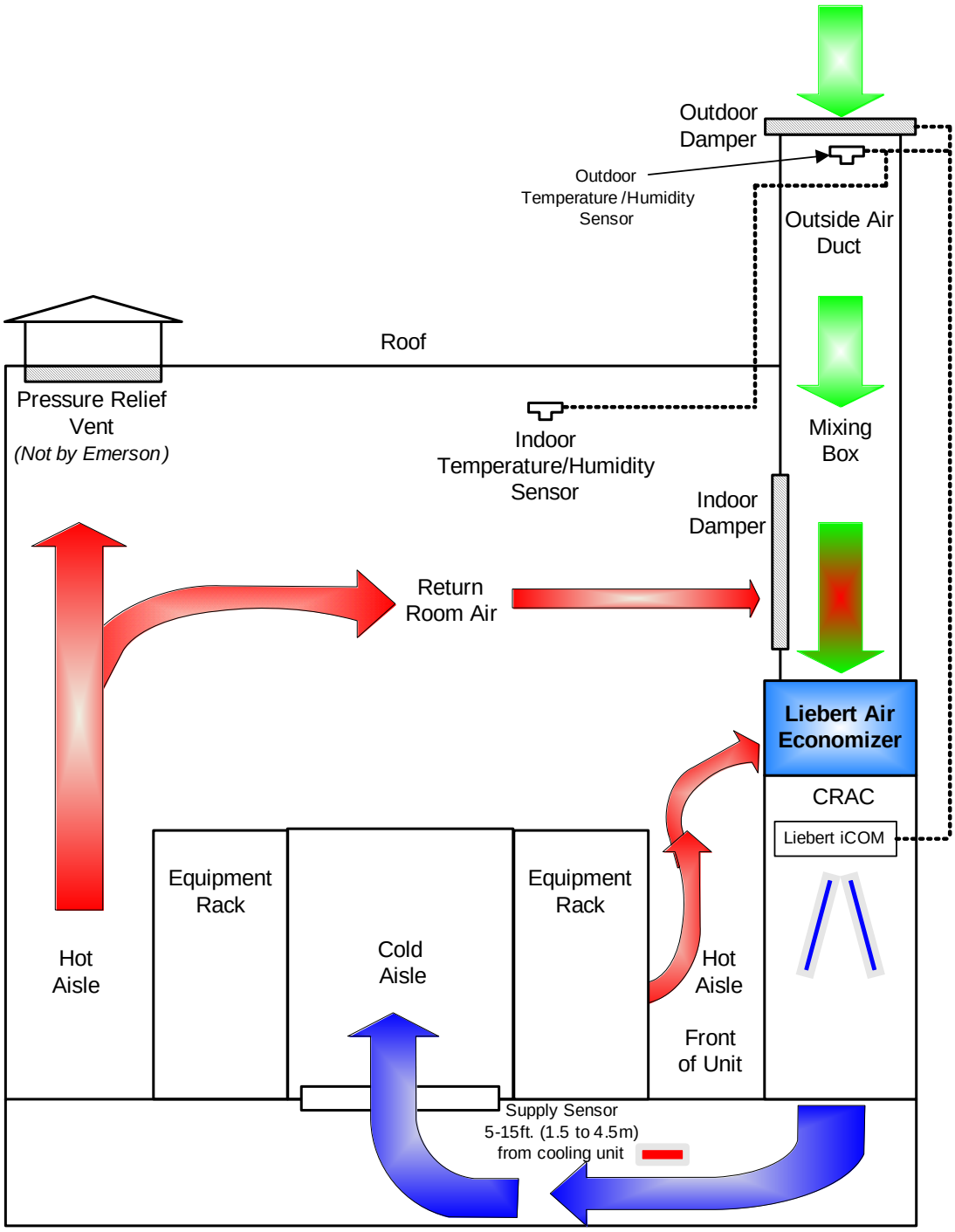
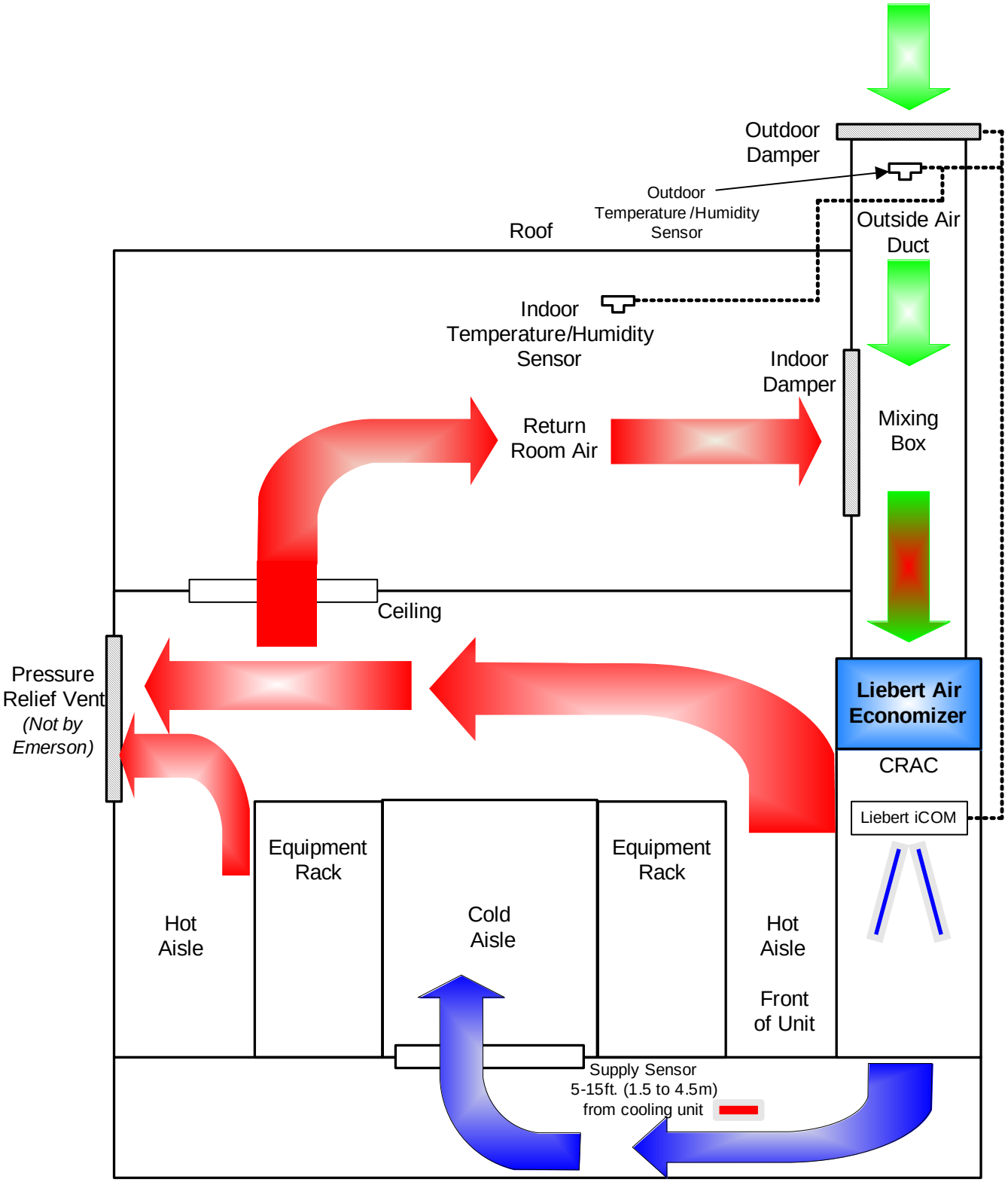


Figure 35 Air flow pattern of a Liebert Air Economizer system-dropped ceiling



Out of Service

When the Liebert Air Economizer™ is not operating, the outside air damper is closed, the return air damper is open and the relief air vent fan is shut down. This permits air from the conditioned space to be drawn into the primary cooling unit, cooled and expelled into the conditioned space. The relief air vent is not required while the Liebert Air Economizer is not in service because no air volume is being brought into the conditioned space.

NOTICE

When a non-Liebert mixing box and damper motors are used, make sure that the following configurations are verified before a unit is placed into service.

• No power to Liebert unit means that there is no power applied to the Liebert Air Economizer damper motors. Without a spring return motor, the dampers will remain in the last position they were in when power was present. Spring return operation during a no-power condition should always be verified at startup.

• While the Liebert Air Economizer is not operating, which could be due to the outdoor air conditions, a manual lockout through the Liebert iCOM or a Unit Off state will result in 2VDC being present on the associated indoor and outdoor analog outputs. The 2VDC signal must result in the outdoor damper being closed and return damper opened.

• During full Liebert Air Economizer operation, the Liebert iCOM will send 10VDC to the return and outdoor damper which must open the outdoor damper and close the return damper to its minimum position of 15%.

NOTICE

Risk of improper operation. Could cause frozen coils, resulting in degraded operation, water leaks, equipment damage and building damage.

Failure to verify that the indoor and outdoor damper operation is correct could result in the freezing of chilled water coils, condensation within the data center or a main fan overload.

3.4.3 Liebert Air Economizer Control Menu Settings

The Liebert Air Economizer control uses an outdoor temperature humidity sensor to detect when outdoor conditions are within the operating range. The outdoor sensor can be monitored from the Service/Economizer data menu on page 2 of 3 (see **Figure 38**).

The Liebert iCOM control is equipped with a series of setup parameters to allow limited adjustment and monitoring of the Liebert Air Economizer's dampers and sensor. To access these parameters from the main unit screen:

1. Press the down arrow key until User Menu is displayed.
2. From the User Menu screen, press the right arrow key to enter the Service Menu.
3. Press the **Enter** key once in the Service Menu and use the arrows to navigate to the **ECO** icon on the bottom row.
4. Once this icon is selected, press **Enter**.

The parameters for the Liebert Air Economizer are now viewable.

Liebert Air Economizer Status Screen

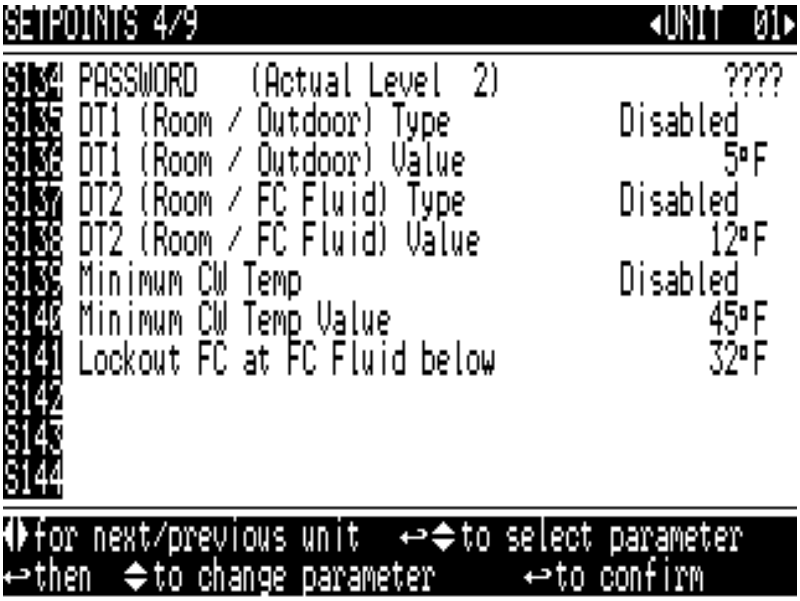
Parameters **SA03** through **SA06** of the Liebert Air Economizer screen will show the current status of the Liebert Air Economizer control. The Liebert Air Economizer will be activated for use if:

- All temperatures and ratios are within the outdoor sensor range
- The outdoor air is cooler than the indoor return air temperature.

Whether the Liebert Air Economizer function is available will be shown at parameter **SA07**—**Economizer Mode (On or Off)**.

The Liebert Air Economizer control allows the range of outdoor air acceptable for cooling to be narrowed by adjusting the Humidity Ratio Min and Max settings. Refer to a psychrometric chart before adjusting humidity ratios.

Figure 36 Liebert DS™ setpoints screen, page 4 of 9


SETPOINTS 4/9
UNIT 01
S134 PASSWORD (Actual Level 2) ????
S135 DT1 (Room / Outdoor) Type Disabled
S136 DT1 (Room / Outdoor) Value 5°F
S137 DT2 (Room / FC Fluid) Type Disabled
S138 DT2 (Room / FC Fluid) Value 12°F
S139 Minimum CW Temp Disabled
S140 Minimum CW Temp Value 45°F
S141 Lockout FC at FC Fluid below 32°F
S142
S143
S144
for next/previous unit ↩to select parameter
↩then to change parameter ↩to confirm

S135 DT1 (Room / Outdoor) Type—Sets the activation point of the ambient dry bulb outdoor temperature as it relates to either an indoor actual temperature or temperature setpoint. If set to "Temp," the outdoor dry bulb temperature is compared to the return temperature actual value. If set to "Set," the outdoor dry bulb temperature is compared to the return temperature setpoint. If set to "Disable," the outdoor temperature will not be compared to the return sensor value for activation. When set to "Temp" or "Set," the outdoor temperature must be lower than the room temperature setpoint or the actual return temperature sensor reading.

In most applications, this parameter will be set to "Temp" because the outdoor air temperature will reduce cooling costs as long as the outdoor air is below the return air temperature to the primary cooling unit. This remains true even when the outdoor temperature is higher than the supply control setpoint. The following examples assume that the unit is set for supply air control and that the moisture content of the outdoor air is within the allowable range.

Example 1

- Return Temperature: 90°F (32°C)
- Outdoor Temperature: 80°F (27°C)
- Supply Air Temperature: 60°F (16°C)

  The conditions in this example would result in a reduction of 10°F entering the unit and would extend the operating range of the Liebert Air Economizer™. The outdoor damper would be 100% open and the mechanical cooling would be utilized to achieve the 60°F (16°C) supply temperature setpoint.

Example 2

- Return Temperature: 75°F (24°C)
- Outdoor Temperature: 80°F (27°C)
- Supply Air Temperature Setpoint: 60°F (16°C)

  In this example, the cooling unit would not use outdoor air because it is warmer than the actual return temperature to the CRAC.

Example 3

- Return Temperature: 75°F (24°C)
- Outdoor Temperature: 40°F (4°C)
- Supply Air Temperature: 60°F (16°C)

  In this example, the cooling unit would open the outdoor damper based on the amount of cooling needed to satisfy the supply air temperature setpoint. The unit should be able to satisfy the supply air setpoint with Liebert Air Economizer operation only.

S136 DT1 (Room / Outdoor) Value—Field-adjustable setpoint or temperature. The type (setpoint or temperature) is based on the setting on S135.

S137 DT2 (Room / FC Fluid) Type—Determines the method to activate the water circuit on dual-cool and free-cool units. When this parameter is set to "Contact," a dry contact closure can be used to activate the free-cooling circuit. When this parameter is set to "Value," the delta between the water temperature of the free-cooling circuit and the actual room temperature are compared.

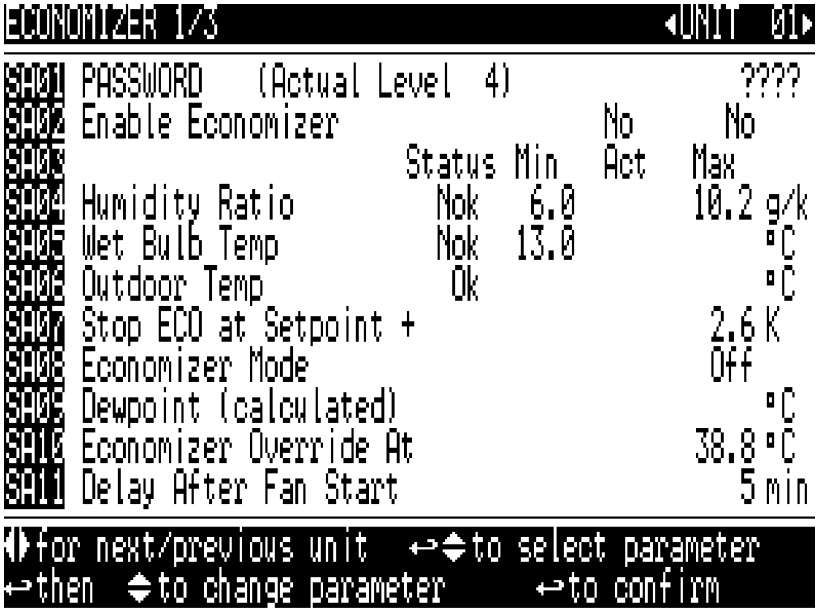
S138 DT2 Room / FC Fluid) Value—Sets the delta between the actual room temperature and the free-cooling fluid temperature to determine if cooling can be provided.

S139 Minimum CW Temp—Enables the temperature at which free-cooling can operate independently without assistance of the compressor circuit.

S140 Minimum CW Temp Value—Sets the water temperature at which 100% free-cooling can be provided to handle the full room load. When the fluid temperature is below this setting then the compressors will no longer turn On until the water temperature is above the minimum CW Temp.

S141 Lockout FC at FC Fluid below—The temperature that turns Off the free-cooling circuit when the water temperature is too low. This setting prevents frost from building up on the free-cooling pipes when the outdoor ambient is extremely low.

Figure 37 Service/Economizer, page 1 of 3


ECONOMIZER 1/3
◂UNIT 01▸
SA01 PASSWORD (Actual Level 4) ????
SA02 Enable Economizer No No
SA03 Status Min Act Max
SA04 Humidity Ratio Nok 6.0 10.2 g/k
SA05 Wet Bulb Temp Nok 13.0 °C
SA06 Outdoor Temp Ok °C
SA07 Stop ECO at Setpoint + 2.6 K
SA08 Economizer Mode Off
SA09 Dewpoint (calculated) °C
SA10 Economizer Override At 38.8 °C
SA11 Delay After Fan Start 5 min
for next/previous unit ↵ to select parameter
↵then to change parameter ↵to confirm

SA02 Enable Economizer—Sets the Liebert Air Economizer™ operation to one of the following modes. These selections only determine if the Liebert Air Economizer is available for use; they do not determine or override damper position. Damper position is always controlled by the sensor set to control temperature (i.e., Return / Supply Sensor)

- **Yes**: This parameter will operate the Liebert Air Economizer based on the outdoor sensor reading and will allow the Liebert iCOM to determine if the conditions are within the acceptable range of operation.
- **NO**: This parameter will disable the Liebert Air Economizer and will not allow Liebert Air Economizer to operate even if the outdoor conditions are acceptable.
- **Remote**: This parameter will enable the Liebert Air Economizer and ignore the outdoor Liebert iCOM sensor even if the conditions are outside the range of operation.

SA04 Humidity Ratio—Sets the minimum and maximum limits of outdoor air based on the amount of moisture content. The humidity ratio is set based on pounds of moisture per pound of dry air. This is equivalent to the dew point temperatures.

SA05 Wet Bulb Temperature—Read-only value that displays the outdoor wet bulb temperature. (This reading will be in metric values.)

SA06 Outdoor Temperature—Displays the actual outdoor temperature based on the Temperature Humidity sensor (Sensor C). When this parameter shows OK, the outdoor temperature requirements have been met to use economization. When NOK is shown, the outdoor temperature is outside the operating range set in the Liebert iCOM control.

SA07 Stop ECO at Setpoint + —Sets the temperature when the Liebert Air Economizer will be disabled due to an increasing outdoor air temperature. This parameter is added to the return air sensor setpoint and then compared to the outdoor temperature reading. If the outdoor temperature reading exceeds the return air temperature setpoint plus this parameter, the Liebert Air Economizer will be disabled. This is factory-set at 20°F (-6.7°C).

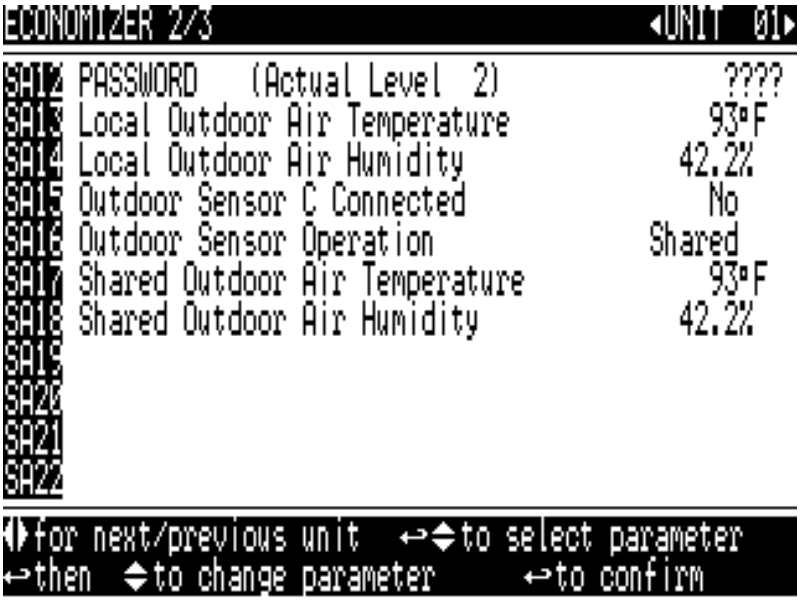
SA08 Economizer Mode—Displayed when the Liebert Air Economizer is available for use.

SA09 Dew Point Calculated—Displays the actual outdoor dew point based on the outdoor sensor.

SA10 Economizer Override At—Sets the indoor temperature when the Liebert Air Economizer™ will be locked out. Even when all other parameters are satisfied, the Liebert Air Economizer will be locked out when the return air temperature sensor reads this value.

SA11 Delay After Fan Start—Sets the delay from the time the unit has been started until the ECO EMERGENCY OVERRIDE can be triggered. This allows airflow to pass over the sensors to get an accurate reading before any emergency modes are activated.

Figure 38 Outdoor sensor data screen


ECONOMIZER 2/3
UNIT 01
SA12 PASSWORD (Actual Level 2) ????
SA13 Local Outdoor Air Temperature 93°F
SA14 Local Outdoor Air Humidity 42.2%
SA15 Outdoor Sensor C Connected No
SA16 Outdoor Sensor Operation Shared
SA17 Shared Outdoor Air Temperature 93°F
SA18 Shared Outdoor Air Humidity 42.2%
SA19
SA20
SA21
SA22
for next/previous unit ↵to select parameter
↵then to change parameter ↵to confirm

SA13 Local Outdoor Air Temperature—Actual outdoor temperature of the sensor connected to the unit.

SA14 Local Outdoor Air Humidity—Actual outdoor humidity of the sensor connected to the unit.

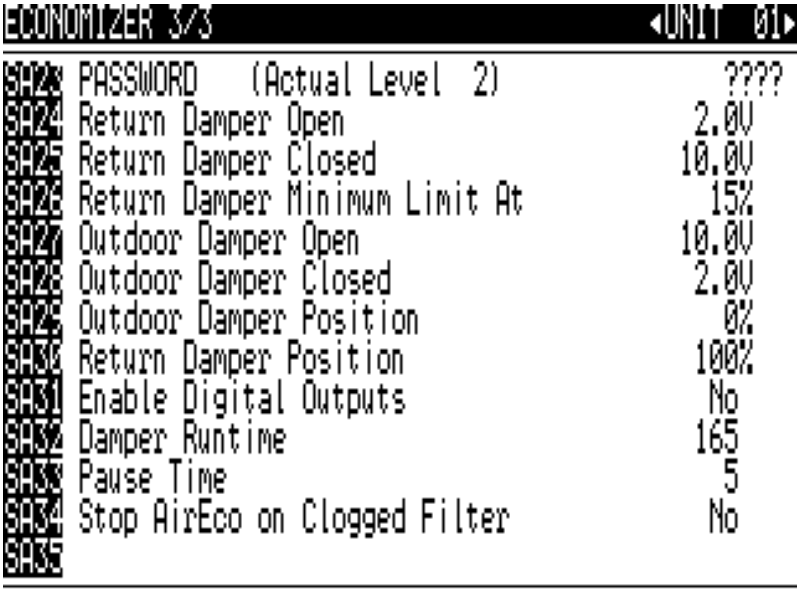
SA15 Outdoor Sensor C Connected—The parameter can be set to Yes or No. The factory default is Yes if air economizer is enabled. When set to Yes, the unit uses the locally installed outdoor air temperature and humidity sensor to help determine air economizer eligibility. When set to No, air economizer eligibility is determined by outside air sensor sharing. Outdoor Sensor Operation must be set to Shared to disable Outdoor Sensor C.

SA16 Outdoor Sensor Operation—The parameter can be set to Local or Shared. The factory default is Shared. When set to Shared, outdoor temperature and humidity readings are averaged among all connected units. The average is used to determine air economizer eligibility. When set to Local, the sensor installed at the unit determines air economizer eligibility without influence from other units connected in the group.

SA17 Shared Outdoor Air Temperature—This read-only parameter displays the shared outside air temperature when Outdoor Sensor Operation is set to Shared.

SA18 Shared Outdoor Air Humidity—This read-only parameter displays the shared outside air humidity when Outdoor Sensor Operation is set to Shared.

Figure 39 Damper settings and limits screen



Parameters **SA24** through **SA30** of the Liebert Air Economizer screen show the return and outdoor damper limits and current position. The return damper will receive a 2VDC signal when fully open and an 8-10VDC signal at its most-closed position.

The outdoor damper will receive a 10VDC signal when fully open and a 2VDC signal when fully closed. If the outdoor conditions do not permit Liebert Air Economizer usage, then the outdoor damper will fully close and the return damper will fully open for normal operation of the primary cooling unit.

The actual outdoor and return damper positions are shown at parameters **SA29**—**Outdoor Damper Position** and **SA30**—**Return Damper Position** (see **Figure 39**).

Air Economizer activation relay—The K11 relay is activated when the Liebert iCOM determines that the Liebert Air Economizer™ is available for use. This relay will remain active during a BMS remote deactivation of the Liebert Air Economizer.

Adjusting control limits with Air Economizer units—A cooling unit equipped with a Liebert Air Economizer will be factory-set to utilize outdoor air based on the current ASHRAE standards. When the outdoor damper is opened Liebert iCOM will automatically disable any humidification control as humidification and dehumidification will not be able to overcome the amount of outdoor air being used. However, other units not equipped with Liebert Air Economizers may continue to humidify and dehumidify the data center. If the room is equipped with a mixture of Liebert Air Economizer and other types of units, then follow these steps.

1. Identify the allowable outdoor air conditions entered into the Liebert iCOM control.
   - Upper dew point 57.5 / Lower dew point 44.
   - Dry bulb is limited, based on the selection in S135.
2. Set the deadband and proportional band of the units based on the allowable outdoor air.
   - Setpoint = 41%
   - Proportional band = 1%
   - Deadband = 17%
   - Return Temperature Setpoint = 75°F

NOTE

Even when the return temperature setpoint is not being used for cooling control, it must be set to operate in Compensated or Predictive humidity control.

3. The units should also be set for predictive humidity control which will compensate for any deviation from the Return Air Temperature setpoint and Relative Humidity Control.

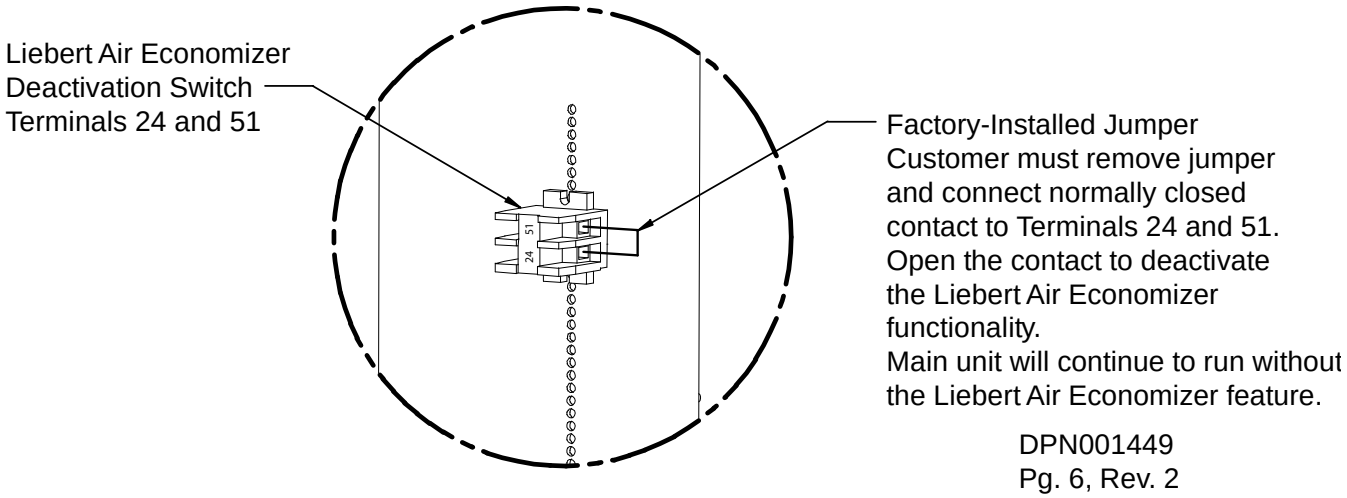
Liebert Air Economizer Variable Speed Fan Operation (VFD and EC Fan)

Upon startup after a loss of power to the Liebert iCOM control board, the main fan will operate at 100% for the first 5 minutes of operation. After running at 100% for 5 minutes, the standard fan control will be able to modulate the fan. For other control modes, refer to **Variable Speed Fans—EC or Variable Frequency Drives on page 18**.

3.4.4 Disable the Liebert Air Economizer™

The Liebert Air Economizer can be disabled through a deactivation switch field-installed and wired to Terminals 24 and 51 in place of the factory-supplied jumper. Removing a factory-installed jumper will deactivate the unit's function (see **Figure 40**). Deactivating the Liebert Air Economizer will transfer all cooling to the primary cooling unit.

Figure 40 Deactivation switch


Liebert Air Economizer
Deactivation Switch
Terminals 24 and 51
24
51
Factory-Installed Jumper
Customer must remove jumper and connect normally closed contact to Terminals 24 and 51.
Open the contact to deactivate the Liebert Air Economizer functionality.
Main unit will continue to run without the Liebert Air Economizer feature.
DPN001449
Pg. 6, Rev. 2

3.5 Temperature Control—Reheat

If the room air temperature becomes too cold, the control will call for heating. Heating mode is controlled by the Temperature Proportional Band, explained in **3.2.1 - Temperature Proportional Band**.

NOTE

Electric Reheat is not allowed during dehumidification. Staged Reheat is used when normal reheat control is selected, the reheats are turned On at the normal control points of 33%, 66% and 100% without influence if or how the compressors are in operation.

Delayed Reheat is permitted only when one compressor is it operation. As soon as both compressors are working, the electric reheats are turned Off.

3.5.1 Electric, Hot Gas and Hot Water Reheat

Different types of cooling units feature different types of standard electrical heating. Not all types offer hot gas or hot water reheat. The number of electrical heating stages also varies—some types of cooling units have single-stage electrical heating as standard and offer two-stage electrical heating as an option. Other types feature three-stage heating as standard.

The Reheat Proportional Band is divided into three equal parts, each representing one reheat stage. As the Temperature Proportional Band increases the call for heating from 0% to -100%, stages 1 through 3 are switched On, as shown in **Figure 41**. Your unit will have one of the nine reheat configuration types shown in **Table 5**.

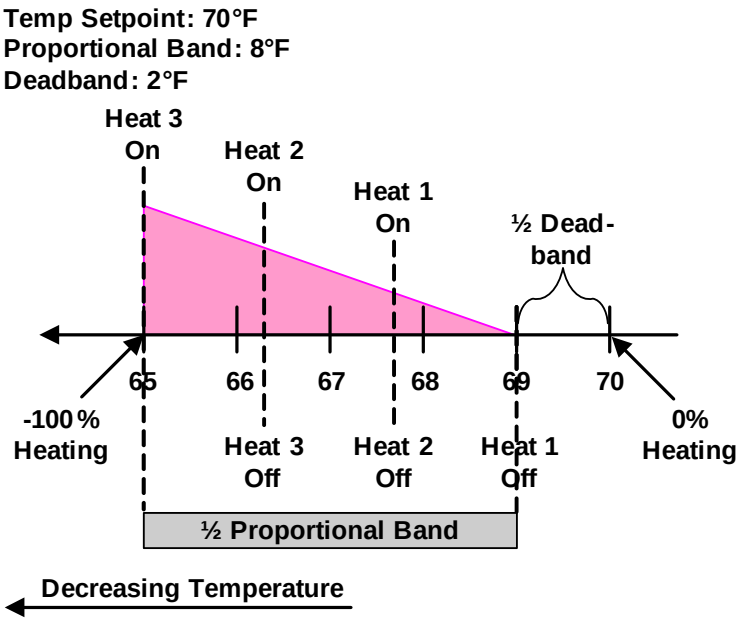
Table 5 Reheat configuration types

Type	A	B	C	D	E	F	G	H	I
Stage 1	Electric 1	Electric 1	Electric 1	Hot Gas	Hot Gas	Hot Gas	Hot Water	Hot Water	Hot Water
Stage 2	-	Electric 2	Electric 2	-	Electric 1	Electric 1	-	Electric 1	Electric 1
Stage 3	-	-	Electric 3	-	-	Electric 2	-	-	Electric 2

NOTE

1. *Hot gas / hot water are not influenced by the setting of electric reheat during dehumidification.*
2. *Hot gas output will be set only if the selected compressor is in operation.*

Figure 41 Three-stage heating



3.5.2 SCR Reheat

SCR reheat is a type of electric reheat that provides tighter temperature control than staged electric reheat. SCR reheat capacity modulation is achieved by pulsing the reheat On and Off. Full capacity is achieved by constantly energizing the reheat. Units equipped with SCR reheat can operate in Tight or Standard mode. By default, cooling units with SCR reheat are factory-set to operate in Tight mode. The mode of operation can be set by adjusting the SCR Control Type parameter (Service Menu, Setpoints).

Tight Mode

NOTE

Tight Mode is not available on chilled water units, units with variable speed fans or units with digital scroll compressors.

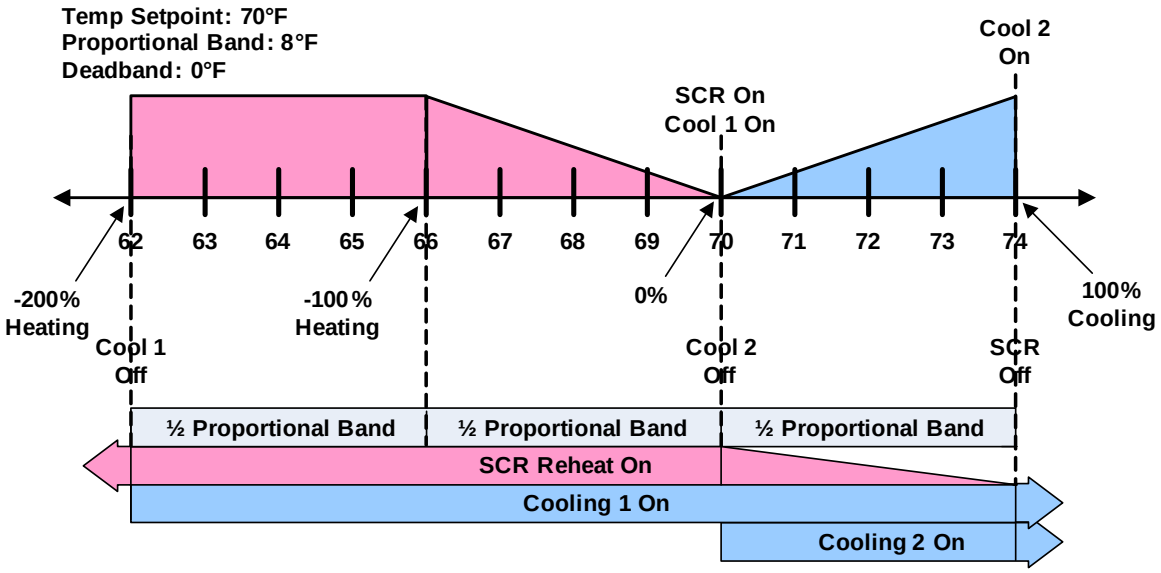
In Tight mode, the compressors and reheats are operated at the same time to provide maximum temperature control. The temperature deadband is set to zero at the factory. In a cooling unit with SCR reheat and two single-step compressors, the first single-step compressor is started and full reheat capacity is provided at 0% calculated output from the Temperature Proportional Band. As the call for cooling increases from 0% to 100%, the reheat capacity is slowly reduced by pulsing the reheat. At 100% call for cooling, the reheat is deactivated and the second single-step compressor is started. As the call for cooling is reduced, the reheat capacity is slowly increased. When the call for cooling returns to 0%, the second single-step compressor is deactivated.

If the Temperature Proportional Band calculates a call for heating from 0% to -200%, the first single-step compressor remains activated and full reheat capacity is provided. Based on the factory default settings, the first single-step compressor is deactivated when the control reaches -200% call for heating. The compressor remains deactivated until the control calls for 0% heating. The compressor activation and deactivation points can be adjusted in the Service menu under Setpoints. **Figure 42** illustrates how a cooling unit with two single-step compressors and SCR reheat operates when the SCR Control Type is set to Tight mode.

NOTE

Some cooling units are not suited for a strict NO LOAD application. These cooling units require a minimal load in the space. Consult factory for verification.

Figure 42 Two single-step compressors with SCR reheat set to Tight mode

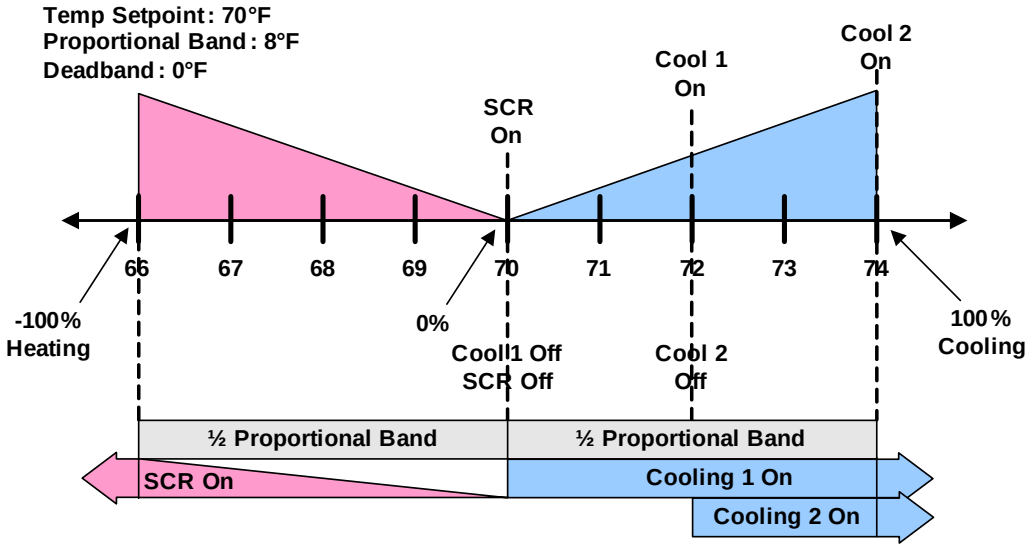


Standard Mode

In Standard mode, the SCR reheat operates only when the Temperature Proportional Band calls for heating. SCR reheat output is adjusted proportionally as the Temperature Proportional Band varies the requirement for heating from 0% to -100%. Compressors operate only when there is a call for cooling as described in **3.2.2 - Compressor Control**.

Figure 43 illustrates how SCR reheat operates when SCR Control Type is set to Standard mode.

Figure 43 Two single-step compressors with SCR reheat set to Standard mode



NOTE

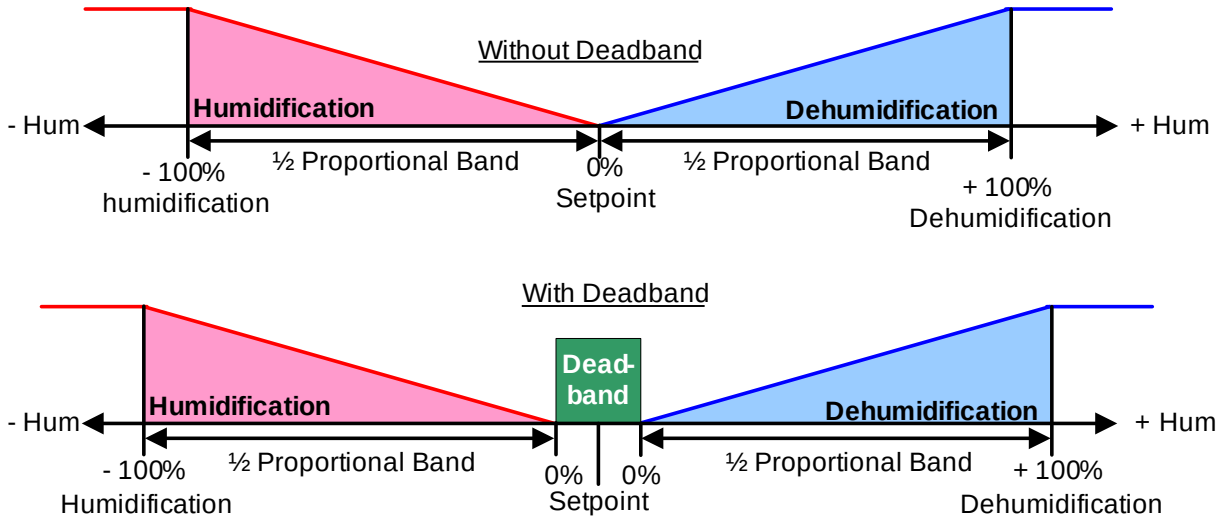
Using SCR in Standard mode in conjunction with variable cooling capacity (e.g., chilled water valve or digital compressor) provides ultimate capacity control and energy-efficiency gains.

3.6 Humidity Control

The control uses the humidity proportional band to determine which operation to perform (dehumidification/humidification) and how much capacity to provide. The Humidity Proportional Band is a user defined range that is divided into two equal parts for dehumidifying and humidifying. The Humidity Setpoint is located between these two equal parts.

An optional Humidity Deadband range can be defined, which is equally divided on either side of the setpoint and separates the two halves of the proportional band. **Figure 44** illustrates how the humidity proportional band is evenly divided on either side of the humidity setpoint, with and without a deadband.

Figure 44 Humidity proportional band



When the return air humidity deviates from the setpoint, either dehumidification or humidification is activated. If the return air humidity increases, the control calls for 0% (none) to 100% (full) dehumidifying capacity, based on how far the humidity penetrates the dehumidification portion of the proportional band. If the return air humidity decreases, the control calls for 0% (none) to -100% (full) humidifying capacity based on how far the humidity penetrates the humidification portion of the proportional band.

When the return air humidity reaches the end of the proportional band, either 100% or -100%, full dehumidification or full humidification capacity is provided. No operation is performed when a 0% call is calculated. The control varies the call for dehumidifying and humidifying in 1% increments as the return air humidity moves through the proportional band halves.

The deadband range is used to widen the setpoint. When the return air humidity falls within the deadband, the control operates the same as if the humidity equaled the setpoint exactly. This setting helps maximize component life by preventing excessive component cycling. The Humidity Proportional Band and Humidity Deadband parameters are in the Service menu under the Setpoints submenu. The Humidity Setpoint parameter is in both the User menu and Service menu under Setpoints.

3.6.1 Humidification

Infrared Humidifier

There are two types of infrared humidifiers: small pan (IFS) and large pan (IFL). The operating mode of each is similar, however, some of the variables or timings differ. The Liebert Challenger 3000™ has different fill times because of the size of the pan.

Infrared humidifiers are started at 100% humidification request, and stopped at 0%. Infrared humidifiers cannot be driven in proportional mode.

Table 6 Parameters for infrared humidifier control

Parameter	IFS Default	IFL Default	Liebert Challenger
Humidity in Last xx Hours	15 hours	15 hours	15 hours
Fill Time	33 seconds	56 seconds	27 seconds
Humidifier On Time	440 seconds	576 seconds	568 seconds
Flush Rate	150%	150%	150%

An autoflush system automatically controls a water makeup valve to maintain proper levels in the infrared humidifier water pan during humidifier operation. If humidification is needed and 15 hours have elapsed since the last time the humidifier was on, then the humidifier is not turned On until the valve completes an initial fill of the humidifier pan. This pre-fill is about 30 seconds for a small pan and 60 seconds for a large pan. The valve continues to fill and flush the pan for about 4-1/2 minutes for a small pan or 7-1/2 minutes for a large pan. Pan size is selected based on unit specifications and is preset at the factory.

During humidifier operation, with the flush rate set at the default of 150%, the valve is opened periodically to add water to the pan (about 45 seconds every 7 minutes of humidifier operation for a small pan, or 80 seconds every 10 minutes of operation for a large pan). This adds enough water to the pan to cause about a third of the total water used to be flushed out of the overflow standpipe located in the humidifier pan. This action helps to remove solids from the pan. The flush rate is adjustable from 110% to 500% in 10% intervals. Default is 150%. If the water quality is poor, it may be desirable to increase the water flushing action above the normal 150% rate. Also, if the supply water pressure is low, the flush rate adjustment can be increased so that sufficient water level is maintained during humidification. The flush rate parameter, Infrared Flush Rate (Service Menu, Options Setup), is adjustable from 110%-500% because the fill valve is controlled by time. It uses a factory-installed integral float to prevent overfilling if the humidifier drain or condensate pump fails.

External Humidifier Control—Optional

A factory-supplied option may be provided to allow a start-stop command to be sent to the control of a remote-mounted humidifier.

Steam Generating Canister Humidifier

The Steam Generating Humidifier has its own separate control board that manages the canister and steam rate. Liebert iCOM sends an On-Off command to relay a call for humidification.

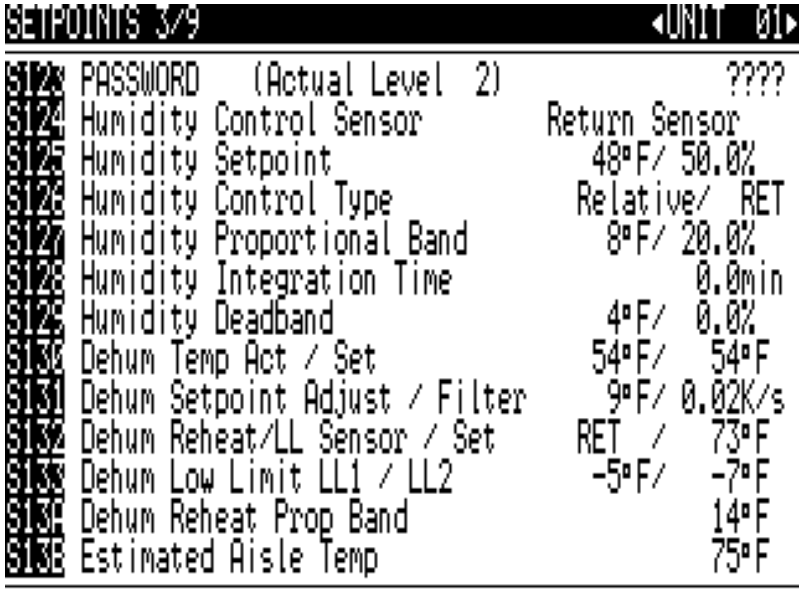
3.6.2 Dehumidification

The Dehumidification Enable parameter (Service Menu, Options Setup) allows for enabling/disabling the dehumidification function.

A call for dehumidification is calculated in the same way as a cooling request. The components (valves, compressors) will follow this dehumidification request as soon as it is higher than the request for cooling the hot gas bypass (if equipped) will disengage on the Liebert Challenger 3000™.

Dehumidification Low Limit

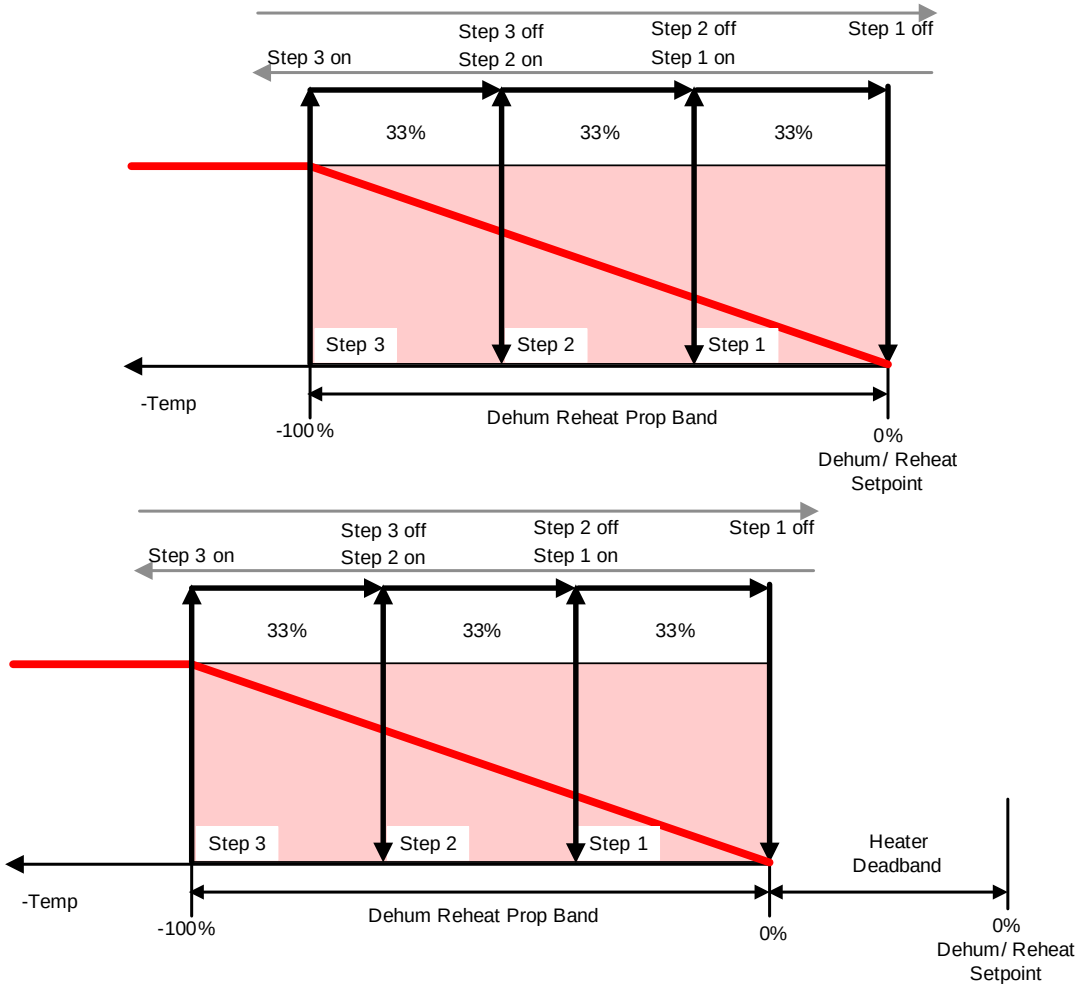
Figure 45 Setpoints screen, page 3 of 9


SETPOINTS 3/9
◂UNIT 01▸
S122 PASSWORD (Actual Level 2) ????
S124 Humidity Control Sensor Return Sensor
S125 Humidity Setpoint 48°F/ 50.0%
S126 Humidity Control Type Relative/ RET
S127 Humidity Proportional Band 8°F/ 20.0%
S128 Humidity Integration Time 0.0min
S129 Humidity Deadband 4°F/ 0.0%
S130 Dehum Temp Act / Set 54°F/ 54°F
S131 Dehum Setpoint Adjust / Filter 9°F/ 0.02K/s
S132 Dehum Reheat/LL Sensor / Set RET / 73°F
S133 Dehum Low Limit LL1 / LL2 -5°F/ -7°F
S134 Dehum Reheat Prop Band 14°F
S135 Estimated Aisle Temp 75°F

NOTE

When the unit is in relative humidity control, only the right side of the menu is displayed and dew point will display the left side of the menu.

Figure 46 Dehumidification and reheat control bands



Low Limit 1 and Low Limit 2 are used to avoid overcooling a room during dehumidification. When a low limit is reached, a compressor or the liquid cooling source that is used for dehumidification is disabled. It is re-enabled when the return air temperature rises. The Low Limit 1 and 2 settings are in the Service menu under Setpoints.

Low Limit 1: Low Limit 1 will disable one of two compressors for dehumidification. If only one compressor is set for dehumidification, or if the dehumidification source is chilled water, this limit will not be visible and will be inactive.

Low Limit 2: Low Limit 2 will disable both compressors for dehumidification. This limit will also stop dehumidification in single compressor units and in chilled water units.

The limits become active when the return air temperature drops below a temperature value equal to the sum of the temperature setpoint plus the value set on Low Limit 1 and 2 (the Low Limit settings are negative values).

A dehumidification source is deactivated if the return air temperature drops below the Deactivation Temperature, as in this example:

Temperature Setpoint:	70°F (21.1°C)
Low Limit Value:	-7°F (-3.8°C)
Deactivation Temperature:	63°F (17.2°C)

NOTE

If a cooling unit is equipped with SCR reheat and the SCR Control Type parameter is set to Tight mode, then Low Limit 2 will be ignored, see ***3.5 - Temperature Control—Reheat****.*

Dehumidification Compressor Quantity

Under Factory Settings in the Advanced menu there is an item called Dehumidification With Comp. This will be set to either 1, 2, 1 or 2, or BOTH. This setting determines which compressors are used for dehumidification. It also determines if Low Limit 1 will be available and impacts how the reheats will operate during dehumidification. The Dehumidification With Comp field is set when the cooling unit is built and should not be adjusted without first consulting the factory. **Table 7** outlines which Low Limit settings will be available, based on the Dehumidification With Comp selection.

Table 7 Dehumidification With Comp settings

Available to Set Value	Dehumidification With Comp Setting	Default Setting On
Low Limit 2 only	[blank] (units without compressors)	All Chilled Water Units
	1 or 2 (Compressor 1 and 2 alternate)	Liebert DS™
Low Limit 1 & 2	Both (both compressors dehumidify)	—

Low Limit 1 and 2 will be available only on cooling units with two compressors when Dehumidification With Comp is set to BOTH.

Low Limit defines the sensor and the setpoint used to determine the low limit thresholds for all cooling and dehumidification modes.

The value of the selected sensor is compared with the setpoint set in S132 + the LL1 / LL2 settings (S133).

Possible selections are:

- 0 = Supply Sensor (selectable only when S102 Temperature Control Sensor is set to “Supply”)
- 1 = Remote Sensor (selectable only when S102 Temperature Control Sensor is set to either “Remote” or “Supply”)

  Falls back to “Supply” when all Remote Sensors are set to “Disabled”
- 2 = Return Sensor - Default for all configurations, and the only allowable setting when S102 Temperature Control Sensor is set to “Return.”

Defaults: Any time the S132 sensor setting changes (away from the default “Return” or back to “Return”), the setpoint will take the same value of what is set in S103 Temperature Setpoint.

Reheat During Dehumidification

Hot gas reheat or hot water reheat will start as described in **3.5 - Temperature Control—Reheat**, when the temperature decreases during the dehumidification process.

The parameter Electric Reheat Operation defines how the heaters react in case the temperature decreases during the dehumidification process. This parameter does not impact SCR reheat operation. The Electric Reheat Operation parameter is in the Advanced menu under Factory Settings and should not be adjusted without factory approval.

No—No electric reheat allowed during dehumidification process.

Delayed—This setting applies only to two-compressor units with BOTH compressors selected for dehumidification. The electric reheats are prevented from turning on until Low Limit 1 is reached. At this condition, one stage of dehumidification is disabled and the reheats are activated. At Low Limit 2, both stages of dehumidification are disabled. When Delayed is selected on units with a single compressor selected for dehumidification (Dehumidification With Comp Setting: 1, 2, and 1 or 2), the reheats will operate in the same manner as they do for Staged as described below. Delayed is the default setting for Liebert DS units.

Staged—This setting applies to one or two compressor units. Electric heaters will stage as described in **3.5.1 - Electric, Hot Gas and Hot Water Reheat**. Staged is the default setting for Challenger 3000 units. On two compressor units with staged reheat selected and Dehumidification With Comp set to BOTH, the control allows for operating two compressors and reheats simultaneously. It is important that electrical service to the unit be sized and wired for this option if selected.

3.7 Control Types

3.7.1 Temperature and Humidity Control Types

The Liebert iCOM has three Temperature and Humidity Control Types:

- Proportional
- PI
- Intelligent

Each control type affects the timing and intensity of the cooling/heating and humidifying/dehumidifying operations. The Control Type parameter is in the Service menu under Setpoints.

Proportional—If Proportional Control is selected, the percent cooling/heating requirement is determined by the difference between the air temperature sensor reading and the temperature setpoint. As the air temperature rises above the temperature setpoint, the percent cooling required increases proportionally (from 0 to 100%) over half the programmable temperature proportional band (See **3.2.1 - Temperature Proportional Band**). The percent heating requirement (0 to -100%) is determined the same way when the air temperature falls below the setpoint. The humidifying/dehumidifying operations are controlled in the same manner as the cooling/heating operations; however, the humidity sensors, setpoints and proportional bands are utilized. The Proportional control type is commonly selected on compressorized units.

PI—PI Control functions with all type of compressors and valves. If PI Control is selected, the percent cooling/heating requirement is calculated by combining two methods, proportional and integral. The proportional term is calculated in a manner similar to the previously described Proportional control. The integral term (sometimes called “reset action”) is calculated by measuring how much and how long the air temperature/humidity has been above or below the setpoint. If the actual air temperature/humidity is above the setpoint, the percent requirement is slowly but continuously increased until the total is sufficient to bring the return room air back to the setpoint.

The control helps to ensure temperature setpoint is achieved while efficiently operating the equipment. The Proportional and Integral concepts work together to prevent excessive valve oscillation, compressor short cycle and temperature fluctuations.

From an idle state (compressor[s] Off, chilled water valve closed, etc.), the call for cooling is based on proportional temperature increase from setpoint. As temperature deviates further from or closer to setpoint, the call for cooling is increased or decreased, respectively. The amount of cooling staged depends on how far the actual temperature has deviated from the setpoint on the proportional (P) band.

Example: Temperature Setpoint= 70°F (21°C)
Temperature Proportional Band= 20°F (11.11 K; see **Note** below)
Room Temperature= 75°F (24°C)

NOTE
k *is the unit of measure used when U404 , Temperature Indication is set for degrees Celsius. K is the conversion from degrees F to degrees C without the -32°F offset. If the proportional band is 20°F, then (20/1.8) = 11.1K*

Because cooling accounts for half of the proportional band, the call for cooling in this example is 50%. If the room temperature increases to 80°F, the call for cooling would be 100%.

Proportional only control will not function satisfactorily in some applications as shown in this example, because the room temperature would increase 10°F (5.5 k) above the setpoint before cooling is staged to 100%. Proportional Control requires a much tighter proportional band to hold the unit closer to the setpoint, which often results in compressor(s) short cycling or valve hunting.

The integration (I) time works with the proportional band in PI Control to stage call for cooling before the actual temperature increases far above the temperature setpoint. The "I" portion does this by doubling the current "P" deviation for every time the "I" has elapsed.

Example: If the "P" deviation is 50% within the "I" time (e.g., 5 min), the call for cooling will be doubled, giving 100% in 5 minutes.

While this happens, the real temperature "P" deviation will decrease. If the "P" deviation drops to 40% and the previously calculated "I" was already on 55%, it will shift back to 45% following "P."

From this point the "I" will continue to calculate the call for cooling, but slower at a slower rate since the actual room temperature has dropped.

Opening the valves or staging compressor(s) to 62% may decrease the temperature from 40% to 20%, which would drive the "I" down from 62% to 42%.

At this point, "P" is 20% and "I" is 42% (call for cooling, valve opening, compressor[s] stage).

This continues until "P" is 0—on the setpoint or within the deadband.

Setting Up PI control

Generally 3-5 minutes integration time is good for most applications. The proportional band may depend on the amount of heat load and other factors. Use **Table 8** as a guide for making the PI control settings.

Table 8 PI control troubleshooting

Problem	Solution
Unit is too slow to activate cooling.	Decrease the proportional band slightly and monitor operation.
Compressor short cycle alarm.	Increase the proportional band slightly and adjust the integration time to 3-5 min. Monitor compressor run time. Run must be higher than 3 minutes to avoid short cycle from occurring.
Excessive valve oscillation or hunting.	Widen the temperature proportional band and/or consider increasing the integration time.

Intelligent—If Intelligent Control is selected, the air temperature/humidity is controlled at or near the setpoint. The percent temperature/humidity adjustment required is calculated based on logic that is programmed into the control. This logic simulates the actions that a human would take if manually controlling the system. This control type is used only on chilled water units.

3.7.2 Humidity Sensor Reading Control Types

The Liebert iCOM has four humidity sensor control types: Dew Point, Relative, Compensated and Predictive. The humidity sensor adjusts how the Temperature and Humidity Control determines the percent requirement for humidification/dehumidification. The humidity sensor control type parameter, Humidity Control Type, is in both the User and Service menus under Setpoints.

Dew Point—The actual return temperature and humidity measured by Liebert iCOM is used internally to determine the dew point. When dew point control is selected, the user will set the humidity setpoint in degrees dew point and will also adjust the proportional band in degrees dew point.

Relative—The actual return air humidity sensor reading is sent to the Temperature and Humidity Control to determine if and how much humidification/dehumidification is required. The actual return air humidity reading is displayed on the Status menu. Unnecessary dehumidification can result when overcooling occurs during a dehumidification cycle. This is because a higher than normal relative humidity (RH) reading is caused by overcooling the room. This extends the dehumidification cycle. Later, when the dehumidification ends and the return air temperature rises to the setpoint, the RH reading falls. The final RH reading will then be lower than actually desired. If significant overcooling occurred, the RH could be low enough to activate the humidifier.

Compensated—The actual return air humidity sensor reading is sent to the Temperature and Humidity Control where the Humidity Setpoint is adjusted based on how much the return room air temperature deviates from the desired temperature setpoint. The adjusted humidity setpoint is used for humidification percent requirement determination. For every 1°C deviation from the temperature setpoint, the humidity setpoint is changed by 3% RH, inversely proportional: if the temperature increases, the humidity setpoint is decreased, and vice versa. The recalculated humidity setpoint is shown as the Actual Humidity Setpoint (User Menu, Sensor Data). As the humidity setpoint is automatically adjusted, the high and low humidity setpoints (User Menu, Set Alarms) are adjusted accordingly. The unadjusted humidity sensor reading is displayed on the Status menu.

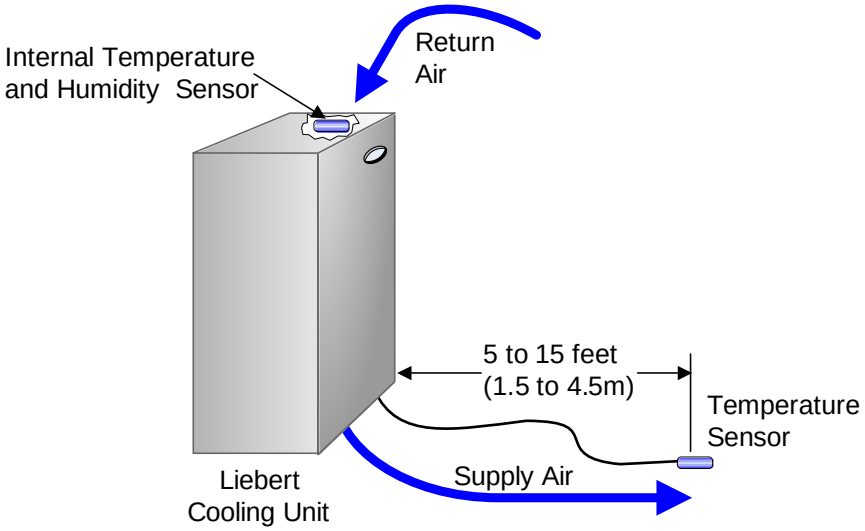
Predictive—The actual return air humidity sensor reading is adjusted before it is sent to the Temperature and Humidity Control. The humidity sensor reading is adjusted based on how much the return room air temperature deviates from the desired temperature setpoint. For every 1°C deviation from the temperature setpoint, the humidity sensor reading is changed by 3% RH, directly proportional: if the temperature increases, the humidity reading is increased and vice versa. The adjusted humidity sensor reading is displayed on the Status menu. Units are shipped from the factory with Predictive humidity control set as default.

If Compensated or Predictive humidity sensor control is selected, overdehumidification is avoided. When overcooling occurs, causing an increase in the relative humidity sensor reading, the humidity control program predicts what the RH will be when the dehumidification cycle ends and return air temperature returns to the setpoint. This allows the dehumidification cycle to end at the proper time. The Compensated and Predictive humidity sensor control can reduce energy consumption by minimizing compressor and reheat operation, and eliminating unnecessary humidifier operation.

NOTE

The historical humidity sensor graphs will display the real (unadjusted) sensor readings, no matter which Humidity Control Sensor Type is selected. The graphical sensor data is in the User menu under Graphics.

Figure 47 Placing temperature and temperature/humidity sensors



3.8 Supply Control

The supply temperature sensor should be placed in an area that is influenced only by the unit it is connected to.

The Supply Air sensor can be used to control or reference the discharge air temperature of the cooling unit. This sensor can be added to existing Liebert iCOMs by purchasing the supply sensor and wiring harness. The supply air sensor must be connected to P13 pins 1 & 2. Contact your local Emerson representative for pricing and installation.

- When the supply sensor is set to Control, the unit will control the amount of cooling / heating being provided based on maintaining the discharge air temperature. The return air sensor may still be used to control fan, humidity or as temperature/humidity reference of the room.

NOTE

On units equipped with a 3P actuator type valve, response can be improved bu using the feedback signal. Feedback is not required for supply air control and is not available on units with fluid economizer. See ***3.2.3 - Chilled Water Control****.*

- **Supply Limit**: Chilled water units may be set up with the supply air sensor to maintain a minimum air temperature under a raised floor to help prevent condensation. To avoid supply temperatures that are too low, the Supply Limit can influence the opening of three-point or analog actuators or the output of analog valves. The control compares the deviation from the return air setpoint and the supply limit setpoint and calculates the output to the actuator from the smaller deviation.

NOTE

Supply control and limit are calculated on each unit, independent of the other sensor readings on the network.

When the supply air sensor is set up for Temperature control, additional Supply Air configuration parameters (valve pulse, cooling filters and return compensation) can be used to further enhance the supply air control.

- The valve pulse and cooling filter timer can be adjusted to prevent oscillating around the supply setpoint and still allow for rapid valve adjustments to compensate for heat load changes. Contact your local Liebert service personnel for adjustments.
- Return Compensation begins to increase the supply air setpoint when the return air decreases below the return air setpoint.

Example

Setting the return compensation value in the Service, Setpoints menu to 5°F (2.7°C) will increase the supply setpoint from 50°F to 55°F (10°C to12.8°C) when the return temperature is at the low limit of the proportional band.

3.9 Liebert Optimized Aisle Control

The Liebert iCOM Optimized Aisle Control has been developed for Liebert DS™, Liebert CW™, Liebert Challenger 3000™, Liebert PEX™ and Liebert HPM™ units to take advantage of the variable fan speed (EC or VFD Fans) and variable capacity (Chilled Water, 4-Step and Digital Scroll) components that are available on these units. This new control scheme uses this variable capacity technology and applies it to ensure that the inlet air temperature to the server is maintained while providing the greatest amount of energy savings. Maintaining the rack inlet air temperature ensures that the IT equipment operates trouble free and keeps the server fans from ramping up from their minimum speed.

Each Liebert cooling unit is equipped with a Liebert iCOM controller that has the ability to collect and control a supply (Discharge) air temperature sensor, a return temperature and humidity sensor and up to 20 rack temperature sensors. The Liebert iCOM Optimized Aisle control utilizes each of these sensors to determine how to adjust the cooling, heating, humidification and dehumidification capacity of the unit.

All floor mount cooling units equipped with Liebert iCOM can communicate with each other through standard Ethernet connectivity. This communication between the units allows coordination of cooling capacity, zoned air flow distribution, fail over protection and different modes of standby operation. To reach the full benefit of the Liebert iCOM Optimized Aisle Control, the units must have this network connected.

Upgrades are available for most Liebert cooling units that are not equipped with the Liebert iCOM control or with a variable speed fan. Contact Emerson Network Power® Liebert Services for additional information.

3.9.1 Operation

Inlet Rack Temperature Control

The Liebert iCOM Optimized Aisle control monitors the inlet temperature to the racks using up to 20 rack temperature sensors that are connected to a Liebert iCOM control. These inlet rack temperature sensors are used to control the air flow (fan speed) of each unit. The air flow is increased when the inlet rack sensors detect a temperature higher than the setpoint and will decrease air flow when the head load decreases or changes to the application are modified (eg., Containment).

Additional Details of Rack Temperature Operation

Refer to **Application and Configuration of Rack Sensors on page 80** for rack sensor setup details.

- The cooling unit's fan speed is determined based on the amount of deviation from temperature setpoint (Proportional) and the length of time the actual temperature has deviated from temperature setpoint (Integral)
- The fan speed control takes into account the actual temperature as it compares to the temperature setpoint and will modify how fast the fans can change speed to avoid overshooting the setpoint.

  In addition to the speed filters, the fan speed also has programmed independent acceleration and deceleration rates

  These control tuning parameters allow the fans to speed up quickly to match rapid heat load changes and react to containment doors being opened and closed while still providing stable control when the application returns to steady state operation.

3.9.2 Supply Temperature Control

The Liebert iCOM monitors and adjusts the supply (discharge) air temperature of the unit to provide a consistent under-floor air temperature by adjusting the compressor capacity or chilled water valve position. The supply temperature control operates the cooling capacity independently of the air flow that is controlled from the inlet rack temperature. The only time that the chilled water valve or the compressor will deviate from the supply temperature control is when temperature compensation has been activated.

The supply sensor should be located 5-15 ft. (1.5-4.5m) from the unit to provide an accurate reading for the control. A 50 ft. (15m) extension cable is available from Emerson if the sensor must be farther than 15 ft. (4.5m) from the Liebert iCOM (P/N 186978G5).

Additional Details of Supply Operation

- The valve(s) / compressor(s) position is based on the amount of deviation from temperature setpoint (Proportional) and the length of time the actual temperature has deviated from temperature setpoint (Integral).
- The valve(s) / compressor(s) also have programmed independent filters that will slow the rate of change as the actual temperature approaches temperature setpoint.

Temperature Compensation

Temperature compensation links between the cold aisle temperatures, cooling capacity and air flow. Changes that could invoke temperature compensation would be the removal of floor tiles in non-cold aisle areas, incorrect supply temperature setpoint, unit failure in another zone or heat load changes greater than expected heat load changes in rack equipment. As a further protection, the temperature compensation routine also ties into the cascade /standby operation when Teamwork Mode 3 is selected.

There are three selectable compensation routines to choose from: Return, Supply or Return + Supply.

Return Compensation: This temperature compensation monitors the return air condition and automatically adjusts the supply air setpoint if return temperatures become too cold. Return compensation can be enabled in all fan and temperature control sensor configurations, with the exception of fan and cooling set for return air control (Enable Return Compensation falls back to "No"). With return air compensation enabled, S103 "Temperature Setpoint" remains unchanged as long as the air temperature is above S114 "Return Compensation Setpoint."

If the return air temperature falls below S114 "Return Compensation Setpoint," S103 "Temperature Setpoint" will be increased. The calculated compensation setpoint is displayed as the left hand value (Act) of line S103 (see **Figure 48**). Return compensation is also indicated from the unit view as shown in **Figure 49**.

Figure 48 Return Compensation Setpoint in Service Menu

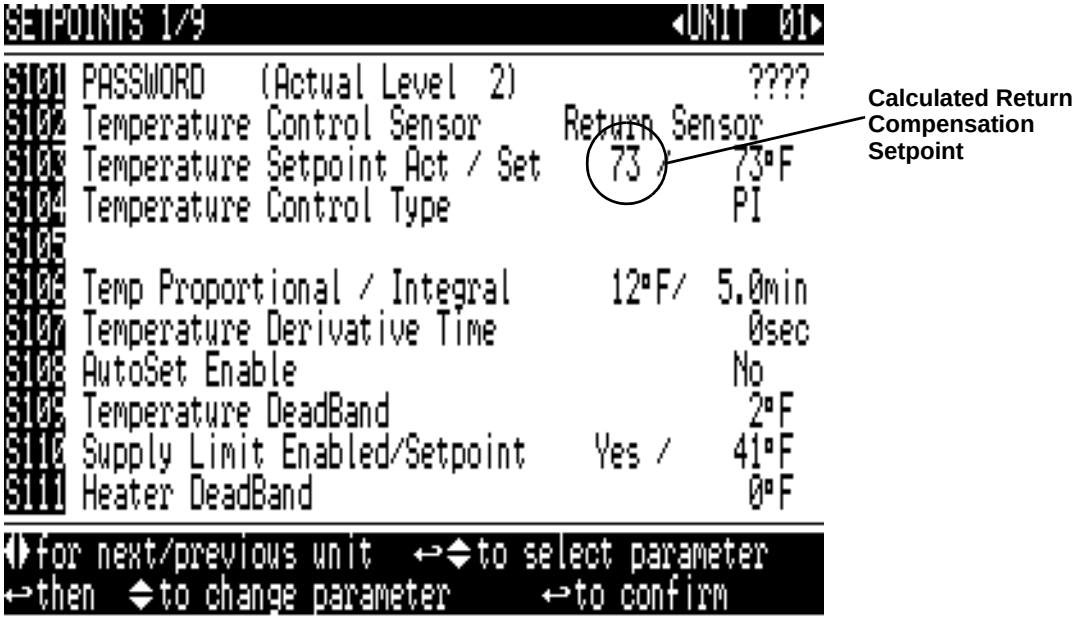

SETPOINTS 1/9
◂UNIT 01▸
S101 PASSWORD (Actual Level 2) ????
S102 Temperature Control Sensor Return Sensor
S103 Temperature Setpoint Act / Set 73 / 73°F
S104 Temperature Control Type PI
S105
S106 Temp Proportional / Integral 12°F/ 5.0min
S107 Temperature Derivative Time 0sec
S108 AutoSet Enable No
S109 Temperature DeadBand 2°F
S110 Supply Limit Enabled/Setpoint Yes / 41°F
S111 Heater DeadBand 0°F
◂▸for next/previous unit ↩⬍to select parameter
↩then ⬍to change parameter ↩to confirm
Calculated Return Compensation Setpoint

Figure 49 Return Compensation in Unit View

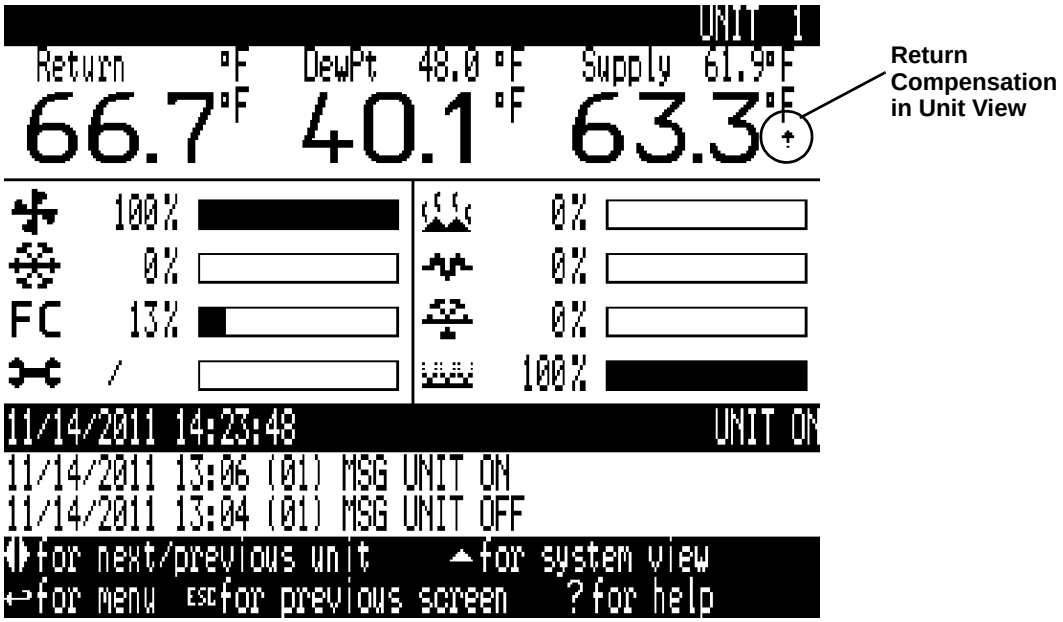
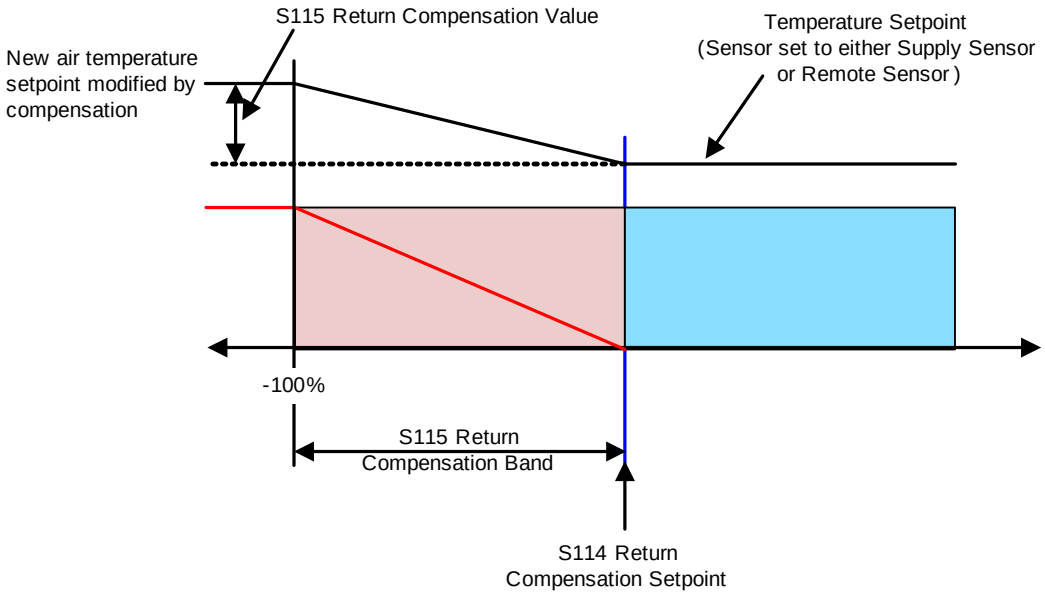
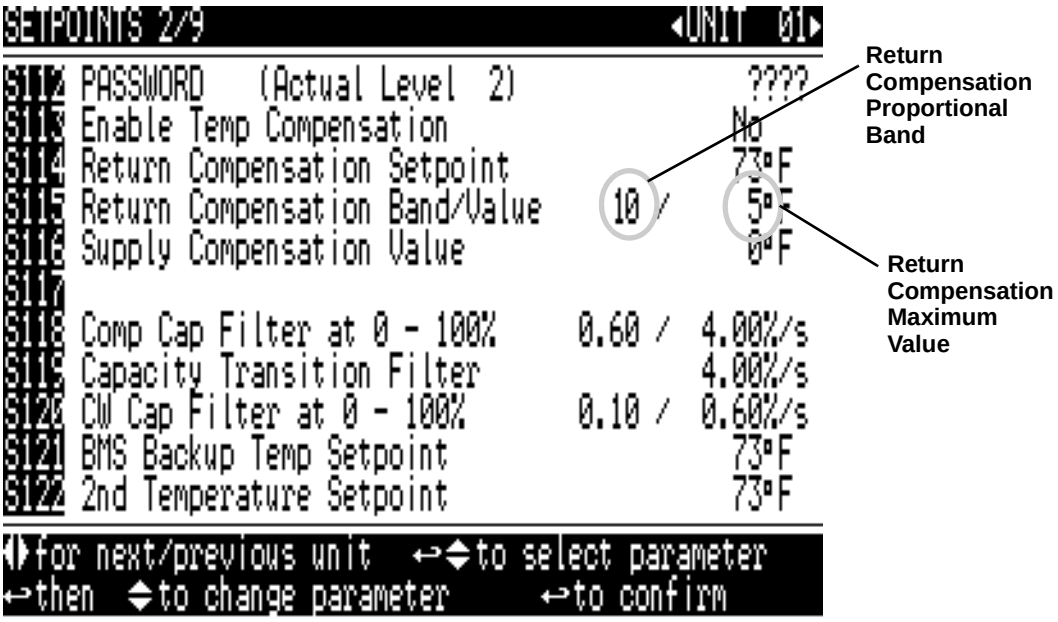


Figure 50 Return Compensation control band


S115 Return Compensation Value
New air temperature setpoint modified by compensation
Temperature Setpoint (Sensor set to either Supply Sensor or Remote Sensor)
-100%
S115 Return Compensation Band
S114 Return Compensation Setpoint

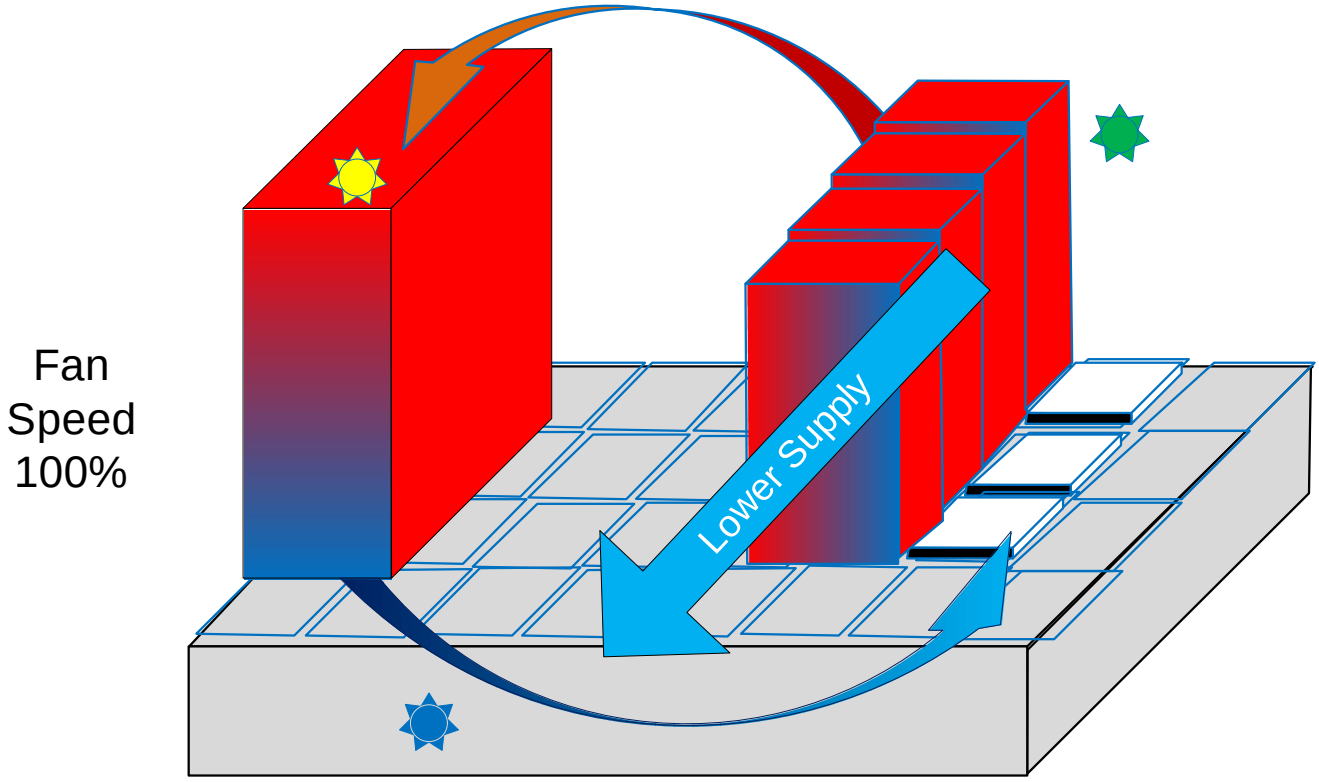
The return compensation setpoint will proportionally increase as the return temperature deviates below S114 “Return Compensation Setpoint.” The compensation proportional band is set on line S115. The compensating proportional band defines the maximum value the air temperature setpoint will increase during return compensation. See **Figure 50**.

Figure 51 Return Compensation setpoint deviation


SETPOINTS 2/9
UNIT 01
S113 Enable Temp Compensation No
S114 Return Compensation Setpoint 73°F
S115 Return Compensation Band/Value 10 / 5°F
S116 Supply Compensation Value 0°F
S118 Comp Cap Filter at 0 - 100% 0.60 / 4.00%/s
S119 Capacity Transition Filter 4.00%/s
S120 CW Cap Filter at 0 - 100% 0.10 / 0.60%/s
S121 BMS Backup Temp Setpoint 73°F
S122 2nd Temperature Setpoint 73°F
for next/previous unit ↩to select parameter
↩then to change parameter ↩to confirm
Return Compensation Proportional Band
Return Compensation Maximum Value

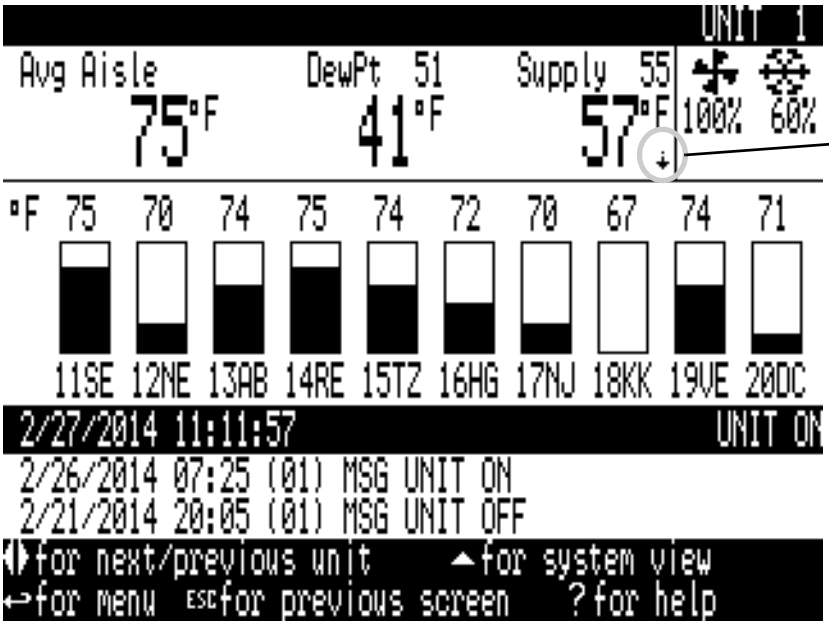
Supply Compensation: Supply temperature compensation allows units to automatically adjust the supply air temperature setpoint when the unit has reached its maximum airflow of 100% and the cold aisle temperature remains above the cold aisle setpoint. In this situation, the temperature compensation feature will proportionally decrease the supply air setpoint until the Inlet rack temperature reaches the setpoint.

Figure 52 Supply compensation



When supply air compensation has been invoked, it will be indicated on the unit view by a small downward-pointing arrow. See **Figure 53**.

Figure 53 Supply Compensation in Unit View



During normal operation, as the rack temperature increases above the fan temperature setpoint, the fan speed will increase until it reaches 100% speed. 100% fan speed is achieved once the controlling temperature reaches a value equal to 100% of the fan control band, or S116 Fan Setpoint + 1/2(S150 Fan Deadband) + 1/2(S149 Fan Temp Prop Band).

How many degrees the supply temperature will be lowered while supply compensation is invoked depends on how many degrees the fan controlling temperature has exceeded the control band compared to S116 Supply Compensation Value.

Example: With a Fan Setpoint of 70ºF and Proportional band of 10ºF, 0ºF deadband, the fan speed is 100% when the rack temperature is 75ºF. If S116 Supply Compensation value = 10ºF, the supply air temperature will lower one degree for every degree the rack temperature increases outside the fan control band. This means if the air temperature setpoint is 65ºF, and the rack temperature increase to 77ºF, the supply air temperature will lower to 63ºF.

Return + Supply Compensation: This selection provides the ability to enable both supply and return compensation settings as described above.

Figure 54 Supply/return compensation

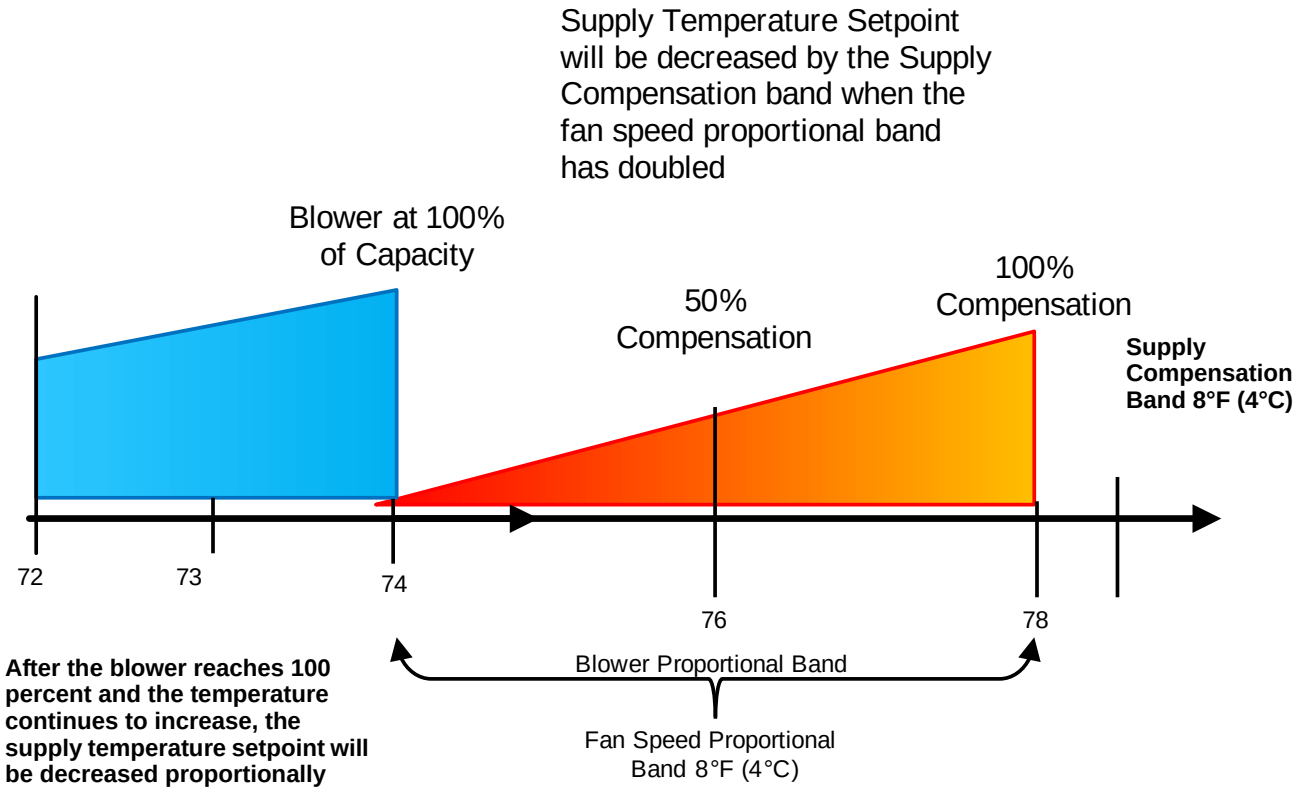
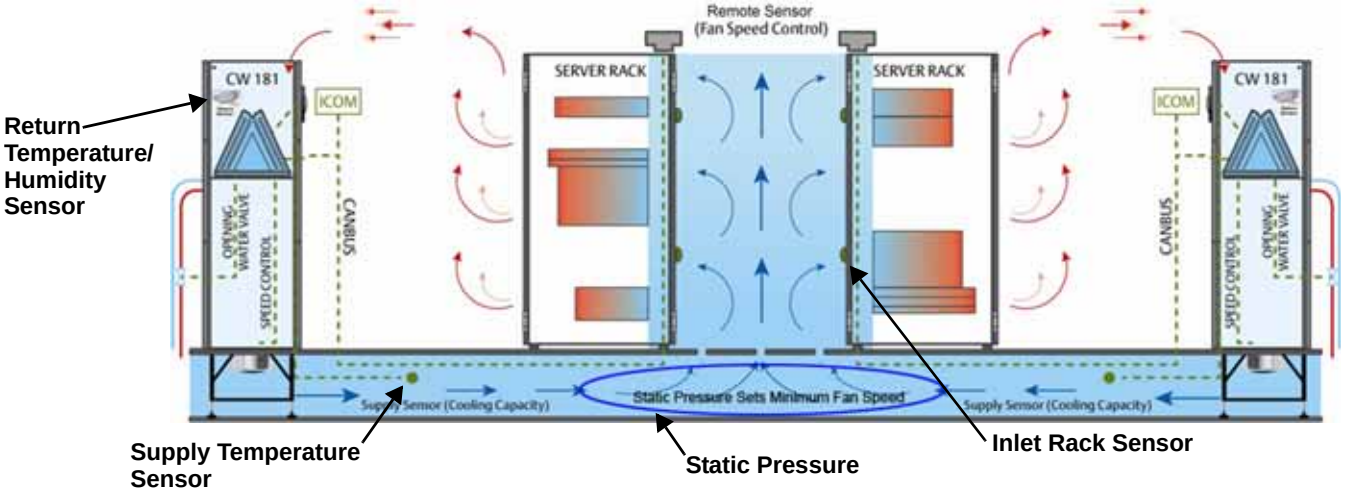

Supply Temperature Setpoint will be decreased by the Supply Compensation band when the fan speed proportional band has doubled
Blower at 100% of Capacity
50% Compensation
100% Compensation
Supply Compensation Band 8°F (4°C)
72
73
74
76
78
Blower Proportional Band
Fan Speed Proportional Band 8°F (4°C)
After the blower reaches 100 percent and the temperature continues to increase, the supply temperature setpoint will be decreased proportionally

Figure 55 Temperature/humidity/static pressure control sensors in Optimized Aisle

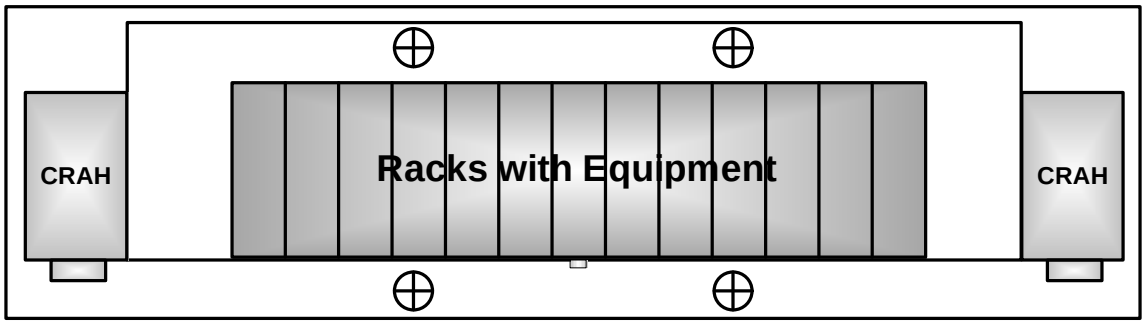


3.9.3 Static Pressure Control

Static pressure control normally refers to the control of a variable air flow device that will maintain a differential static pressure between two points. The two points of measurement are typically a point(s) below the raised floor in comparison to a point(s) above the raised floor, also known as ESP (External Static Pressure). There are other static pressure points within the data center that have also been used for control like the pressure differential between the inlet of a server rack as it compares to the outlet of a server rack in a containment application. No matter where the differential pressure is measured for control, the objective behind the control is to achieve the same result. Since static pressure measures the potential to flow air from the area of a higher pressure to a lower pressure, the result static pressure is trying to achieve is air flow.

The control method of static pressure is to define a setpoint in either inches of water column or in Pascal's that a controller will use to compare the actual differential pressure reading from either a single pressure sensor or multiple pressure sensors. The actual reading from the sensor is then compared to the static pressure setpoint and the fan speed is adjusted to keep the actual pressure reading at setpoint. The static pressure setpoint is selected by determining the amount of pressure it takes to produce air flow across a specific component. The components in a data center are normally a perforated floor tile or a contained hot / cold aisle.

Figure 56 Senor placement



Static pressure control in a data center has been derived from the building air management systems with the promises of a consist CFM or air flow from perforated floor tiles as they are added or removed from the white space. Using static pressure to control fan speed within an air handler with VAV (Variable Air Volume) systems has been applied successfully for many years. The key component that allows the system to work so well within an air handler system is the VAV box. In this type of system the VAV box controls the flow of air by adjusting a damper based on the local temperature that the VAV box serves. As the VAV box opens and closes to maintain its zone temperature a secondary control speeds up and slows down the supply fan to maintain a specific supply duct static pressure. As the zone heats up, the damper opens which lowers the static in the duct and the fan speeds up. Keep in mind that the zones are still controlled by temperature while the static pressure is only providing the potential to flow air by keeping a higher pressure in the duct than the area being conditioned.

For a data center to be as effective using static pressure control to maintain fan speed each perforated floor tile would need to act as a VAV damper box. Unfortunately, many of the data centers operating today do not have automatically adjusting dampers that adjust the air flow from each perforated tile.

Without the VAV part of the system, a raised floor data center application becomes a manual process to fine tune perforated tile locations based on server CFM demand. Static pressure control is also very dependent on the sensor position under the floor as floor obstructions like piping and cables can affect static pressure readings. In addition CRAH unit location and perforated tile placement can cause vortexes under the floor that would also affect the static pressure readings.

Understanding the limitations for static pressure to automatically adjust the fan speed based on the IT equipment demand should prompt an initial CFD (Computational Fluid Dynamics) evaluation of the site to determine high and low pressure areas under the floor. In addition CFD's should be performed when the floor tile arrangement changes or the IT equipment demand changes. The under floor environment will also change based on the floor tile arrangement changes and may not relate to above floor air flow expectations. The SixSigma® and Tile Flow® simulations in the next sections will illustrate under floor airflow in relation to tile flow and how the two variables change based on a unit being turned Off or in standby.

Contact your local Emerson representative for more information or to order the static pressure kit.

The Liebert iCOM control can accept a signal from a static pressure sensor connected to an available analog input and powered from T2 to modulate the fan speed as part of the Optimized Aisle Control.

Figure 57 Static pressure sensor Liebert iCOM installation

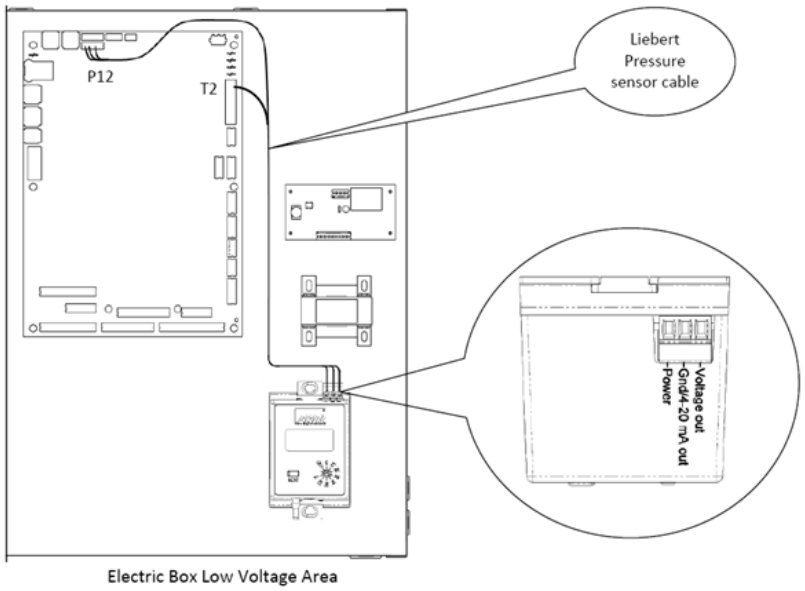


Figure 58 Static pressure sensor placement

There are two modes of control that can be selected when using static pressure to modulate EC and VFS fans with Optimized Aisle Control: limit and control. This selection can be made at S190 in the Service Setpoints Menu. The limit control method modulates the fan to ensure that the static pressure never falls below the static pressure setpoint, S191. If the static pressure is above the setpoint the fan will not be ramped down. The control method modulates the fan to ensure the static pressure setpoint is maintained. It will increase and decrease the fan speed to maintain the static pressure setpoint.

Figure 59 S190 Limit

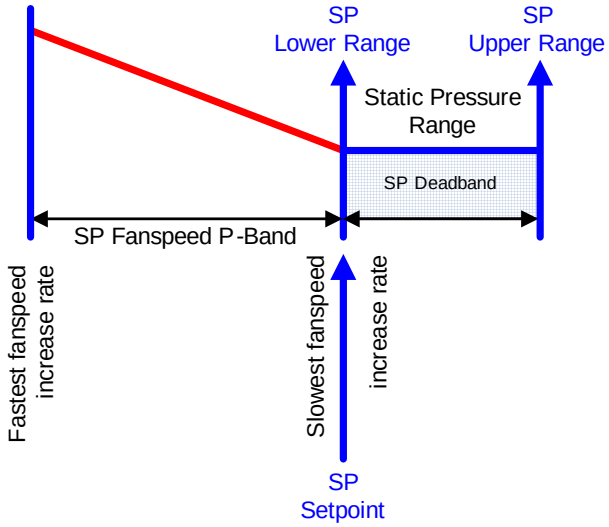


Figure 60 S190 Control

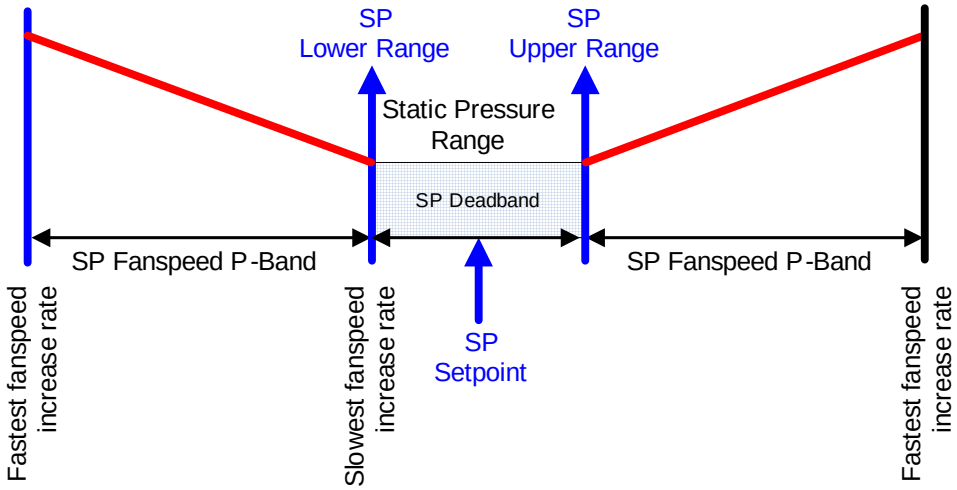
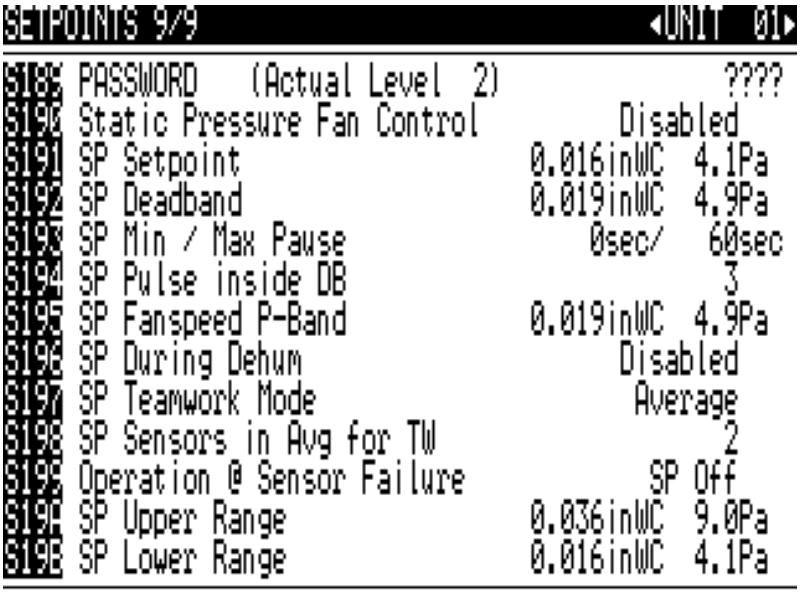


Figure 61 Setpoints screen, page 9 of 9


SETPOINTS 9/9
UNIT 01
S188 PASSWORD (Actual Level 2) ????
S189 Static Pressure Fan Control Disabled
S190 SP Setpoint 0.016inWC 4.1Pa
S191 SP Deadband 0.019inWC 4.9Pa
S192 SP Min / Max Pause 0sec/ 60sec
S193 SP Pulse inside DB 3
S194 SP Fanspeed P-Band 0.019inWC 4.9Pa
S195 SP During Dehum Disabled
S196 SP Teamwork Mode Average
S197 SP Sensors in Avg for TW 2
S198 Operation @ Sensor Failure SP Off
S199 SP Upper Range 0.036inWC 9.0Pa
S19A SP Lower Range 0.016inWC 4.1Pa

S190 Static Pressure Fan Control—Enables or Disables the use of static pressure control for fan modulation. This parameter is selectable between Disabled and Enabled. The factory default is Disabled.

S191 SP Setpoint—Sets the static pressure setpoint to be used by the control to modulate fan control. This parameter is selectable from 0.008 to 1.003 inWC (2.0 to 250 Pa). The factory default is 0.020 inWC (5 Pa).

S192 SP Deadband—Sets the static pressure deadband. This parameter is selectable from 0.008 to 1.003 inWC (2.0 to 250 Pa). The factory default is 0.020 inWC (5 Pa).

S193 SP Min / Max Pause—Sets the minimum and maximum pauses times when the static pressure crosses into the deadband border. The fanspeed will stop increasing or decreasing based on the time set in these parameters. This parameter are selectable from 0-180 sec for SP Min and the default is 30 sec and parameter SP Max is selectable from 2-180 sec and the default is 60 sec.

S194 SP Pulse inside DB—Sets the pulse time that the speed filter, S158, will be performed to the fan analog output. This parameter is 2-15 sec and the default is 3 sec.

S195 SP Fanspeed P-Band—Sets the proportional band for which the fanspeed modulation output calculation is based upon in relation to the difference between the pressure reading and the “SP Setpoint.” This parameter is selectable from 0.008 to 1.003 inWC (2.0 to 250 Pa). The factory default is 0.020 inWC (5 Pa).

S196 SP During Dehum—Sets the use of static pressure control if dehumidification becomes active. If set to Disabled then the static pressure routines will become inactive and the fan will be allowed to ramp to the dehumidification speed set on line S153. If set to Enabled then the static pressure routines shall remain active during the call for dehumidification. This parameter is selectable between Enabled and Disabled. The default is disabled.

S197 SP Teamwork Mode—There are modes available for static pressure teamwork functionality: Average and Minimum. When selecting the Average Mode: the average of the lowest static pressure readings in the system will be averaged to generate a shared static pressure value for all units in the team. The number of static pressure sensors to be averaged is set on line S198. When this number is set to a value lower than the number of units in the team, the lowest static pressure readings will be averaged.

When selecting the Minimum Mode: the lowest static pressure reading in the team will be applied to the entire team. This parameter is selectable between Average and Minimum. The factory default is Average.

S198 SP Sensors in Avg for TW—Sets the number of sensors used when averaging sensors in the team work. This parameter is selectable from 1-32. The factory default is 2.

S199 Operation @ Sensor Failure—This parameter determines what action to take if the static pressure sensor fails (non-teamwork). There are two options to use when handling a static pressure sensor failure, they are SP OFF = static pressure control Off, where the control will use S146 to control the fan when the sensor is lost or Freeze Speed = keep the fanspeed unchanged based on the last reading to iCOM. Things that need to override fanspeed such as freeze protection can still change the fanspeed.

S19A SP Upper Range—The control calculates the Upper Range by using S191 "SP Setpoint" and S192 "SP Deadband," the results on lines show both values, in WC and Pa.

S19B SP Lower Range—The control calculates the Lower Range by using S191 "SP Setpoint" and S192 "SP Deadband," the results on lines show both values, in WC and Pa.

3.10 Event Types and Properties

Liebert iCOM events are used to inform the user of cooling unit operational status. All events are recorded in the Event Log, which is in the User Menu. The user can change the type (alarm, warn, message) and time delay of some events and can also enable or disable some events. These event settings are in the Service Menu under Set Alarms, pages 3 to 7. If an event has a safety function (high pressure, low pressure, main fan overload, etc.), the safety function will be executed in any case, independent of the selected event type or if enabled or disabled. The timing will function as set.

NOTE
Not all critical event properties can be adjusted.

Event Types

- **Message**: If this event occurs, it will only be entered into the event log.
- **Warning**: If this event occurs, a warning will be generated and entered into the event log. The common alarm relay will be activated only if parameter Warning Activates Alarm Relay located in the Service menu under Alarm Setup is set to Yes. The factory default setting is Yes.
- **Alarm**: When an alarm is received, a red light on the Liebert iCOM will blink and an alarm will sound, unless turned Off in the User Display Setup Menu. Pressing the alarm button will acknowledge the alarm but not clear the alarm. The alarm will not be cleared until the issue has been corrected, reset internally by the control or reset manually by the user. For instance, alarms such as High Pressure can be cleared by changing the alarm counter back to 0. If this event occurs, an alarm will be generated and entered into the event log. An alarm does not necessarily switch Off the whole cooling unit; it depends on which alarm occurs. If a standby unit is set, any alarm will stop the faulty unit and start the standby unit. Standby activation functions only on alarms; messages or warnings will not start a standby unit. For more on standby units, see **4.0 - Teamwork**.

Time Delay

Delays the event reaction once it is triggered. The time delay applies to safety functions and is entered in seconds.

Enable or Disable

Disabled events do not show up in the event log, on the display or on monitoring devices. Also, the common alarm relay will not be activated if a disabled alarm occurs. Safety functions, such as lockout compressor in case of high pressure are still performed.

NOTE
Once an event, either Warn or Alarm type, has been set to Disable, the associated alarm condition will not be annunciated. Disabled events may be reset only through the menu item Reset Disabled Alarms.

NOTE
The value of the external delay includes the internal delay if it is greater than the internal delay.

*The minimum setting of the external delay is the value of the internal delay. This is valid only for values marked with *.*

Table 9 Possible event settings—some events not available in all units

Event	Internal Delay (Before Action Occurs)	Default Delay / Selectable (Before Action Occurs)	Type (default)
MAIN FAN OVERLOAD	2 seconds	5 seconds / 0 – 9999 *	ALM
LOSS OF AIRFLOW	3 seconds	3 seconds / 0 – 9999 *	ALM
CLOGGED FILTERS	2 seconds	2 seconds / 0 – 9999 *	WRN
HIGH ROOM TEMP	1 Min After Fan On	30 seconds / 0 – 9999	Fixed to WRN
LOW ROOM TEMP	1 Min After Fan On	30 seconds / 0 – 9999	Fixed to WRN
HIGH ROOM HUM	1 Min After Fan On	30 seconds / 0 – 9999	Fixed to WRN
LOW ROOM HUM	1 Min After Fan On	30 seconds / 0 – 9999	Fixed to WRN
HIGH TEMP SENSOR A	1 Min After Fan On	30 seconds / 0 – 9999	Fixed to WRN
LOW TEMP SENSOR A	1 Min After Fan On	30 seconds / 0 – 9999	Fixed to WRN
HIGH HUM SENSOR A	1 Min After Fan On	30 seconds / 0 – 9999	Fixed to WRN
LOW HUM SENSOR A	1 Min After Fan On	30 seconds / 0 – 9999	Fixed to WRN
COMP 1 OVERLOAD	Internal Calc.	no	ALM
COMP 2 OVERLOAD	Internal Calc.	no	ALM
COMP 1 HIGH PRESSURE	Internal Calc.	no	ALM
COMP 2 HIGH PRESSURE	Internal Calc.	no	ALM
COMP 1 LOW PRESSURE	Internal Calc.	no	ALM
COMP 2 LOW PRESSURE	Internal Calc.	no	ALM
COMP 1 PUMPDOWN FAIL	Internal Calc.	no	ALM
COMP 2 PUMPDOWN FAIL	Internal Calc.	no	ALM
DIG SCROLL1 HIGH TEMP	Internal Calc.	no	ALM
DIG SCROLL2 HIGH TEMP	Internal Calc.	no	ALM
EL HEAT HIGH TEMP	5 Sec	0 sec / 0 – 9999	WRN
WORKING HRS EXCEEDED	0 Sec	0 sec / 0 – 9999	Fixed to WRN
SMOKE DETECTED	2 Sec	2 sec / 0 – 9999 *	ALM
WATER UNDER FLOOR	2 Sec	2 sec / 0 – 9999 *	ALM
COND PUMP-HIGH WATER	2 Sec	2 sec / 0 – 9999 *	ALM
LOSS OF FLOW	5 Sec Reset Delay: 10 Sec	2 sec / 0 – 9999 *	ALM
STBY GLYCOL PUMP ON	2 Sec	2 sec / 0 – 9999 *	ALM
STANDBY UNIT ON	2 Sec	2 sec / 0 – 9999 *	ALM
HUMIDIFIER PROBLEM	2 Sec	2 sec / 0 – 9999 *	ALM
NO CONNECTION w/Unit1	Internal Calc.	-	WRN
UNIT X DISCONNECTED	Internal Calc.	-	WRN
LOSS OF POWER	0 Sec	No	ALM
CUSTOMER INPUT 1	2 Sec	2 sec / 0 – 9999 *	ALM
CUSTOMER INPUT 2	2 Sec	2 sec / 0 – 9999 *	ALM
CUSTOMER INPUT 3	2 Sec	2 sec / 0 – 9999 *	ALM
CUSTOMER INPUT 4	2 Sec	2 sec / 0 – 9999 *	ALM
CALL SERVICE	2 Sec	2 sec / 0 – 9999 *	MSG
HIGH TEMPERATURE	2 Sec	2 sec / 0 – 9999 *	MSG
LOSS OF AIR BLOWER 1	2 Sec	2 sec / 0 – 9999 *	ALM
REHEAT LOCKOUT	2 Sec	2 sec / 0 – 9999 *	WRN
HUMIDIFIER LOCKOUT	2 Sec	2 sec / 0 – 9999 *	WRN
FC LOCKOUT	2 Sec	2 sec / 0 – 9999 *	WRN
COMPRESSOR(S) LOCKOUT	2 Sec	2 sec / 0 – 9999 *	WRN
COMP 1 SHORT CYCLE	0 Sec	0 - 9999	MSG
COMP 2 SHORT CYCLE	0 Sec	0 - 9999	MSG
No Power	0	0 seconds / 0-9999	WRN

Table 9 Possible event settings—some events not available in all units (continued)

Event	Internal Delay (Before Action Occurs)	Default Delay / Selectable (Before Action Occurs)	Type (default)
Condensate 1 Failure	0	5 seconds / 0-9999	WRN
Condensate 2 Failure	0	5 seconds / 0-9999	WRN
EC Fan Fault	0	10 seconds / 0-9999	ALM
HIGH SUP TEMP	0	30 seconds / 0-9999	WRN
LOW SUP TEMP	0	30 seconds / 0-9999	ALM
REDUCED ECO AIRFLOW	0	3 seconds / 0-9999	WRN
ECO HI TEMP OVERRIDE	0	10 seconds / 0-9999	WRN
TEMP CTRL SENSOR FAIL	0	3 seconds / 0-9999	ALM
HIGH DEW POINT	0	30 seconds / 0-9999	WRN
LOW DEW POINT	0	30 seconds / 0-9999	WRN
HI DEW POINT SENSOR A	0	30 seconds / 0-9999	WRN
LOW DEW POINT SENSOR A	0	30 seconds / 0-9999	WRN
HIGH REMOTE SENSOR	0	30 seconds / 0-9999	WRN
POWER “A” FAILURE	0	10 seconds / 0-9999	ALM
POWER “B” FAILURE	0	10 seconds / 0-9999	ALM
AIRFLOW SENSOR FAILURE	0	10 seconds / 0-9999	WRN
HUM CTRL SENSOR FAIL	0	30 seconds / 0-9999	WRN
LOSS OF FLOW	0	5 seconds / 0-9999	ALM
STAT PRES SENSOR FAIL	0	120 seconds / 0-9999	ALM
LOW STATIC PRESSURE	0	120 seconds / 0-9999	WRN
HIGH STATIC PRESSURE	0	120 seconds / 0-9999	WRN
STATPRES OUT OF RANGE	0	150 seconds / 0-9999	WRN
DAMPER FAILURE	0	10 seconds / 0-9999	ALM
BMS DISCONNECTED	0	ENABLED / DIS - ENAB	WRN

3.10.1 High- and Low-Temperature and Humidity Events

High- and low-temperature and humidity alarms can be set for both the internal and optional external sensors. If a sensor reading exceeds a preset threshold, a warning will appear. These warnings are ignored after unit startup for a minimum of 1 minute. To increase the delay to warn, see **3.10 - Event Types and Properties**. The threshold settings are located in both the User and Service menus under Set Alarms.

To apply threshold limits on the internal cooling unit sensors, the Return Sensor Alarms must be enabled. The high and low temperature and humidity internal sensor thresholds can then be set. To apply threshold limits on the optional external sensors, the Sensor A alarms must be enabled. The high and low temperature and humidity external sensor thresholds can then be set. If no external sensors are connected to the unit, it is recommended that the Sensor A Alarms be disabled.

NOTE

The event messages will automatically reset if the temperature/humidity stays 1.8°F (1°C)/ 2% RH below or above the threshold for one minute.

3.10.2 User Inputs

The user can connect and specify up to four inputs depending on unit configuration. The user inputs are digital inputs that can provide information about an event associated with the unit or space. The customer input configuration settings are in the Service menu under Set Alarms, Screen 2 of 7. The choices for the customer inputs are shown in **Table 10** along with their associated reaction. The customer inputs can be programmed as normally open or normally closed to alarm. A terminal strip is provided in the cooling unit to connect your contact closure to. You have the ability to set the control to react on an open or closed contact.

NOTE

To enabled/disabled, delay activation and set event type (alarm, warn, message) see ***Event Types on page 67***.

Table 10 Customer inputs

Setting	Reaction
Smoke	Event Only
Water Alarm	Event Only
C PMP Alarm	Event Only
Flow Alarm	Event Only
Stdby G Pmp	Event Only
Stdby Unit	Event Only
C-Input 1	Event Only
C-Input 2	Event Only
C-Input 3	Event Only
C-Input 4	Event Only
Rht Lockout	Event + Electrical Heaters Disabled
Hum Lockout	Event + Humidifier Disabled
Rht+Hum Lock	Event + Electrical Heaters and Humidifier Disabled
Comp Lockout	Event + Compressor(s) Disabled w/o Pump Down
Call Service	Event Only
High Temp	Event Only
Air Loss	Event Only
FC Lockout	Event + Free-Cooling Disabled
Heater Alarm	Event + Heaters Off (Liebert PeX™ Only)
Flow AL SD	Event + Shut Down the Unit
Flow AL LC	Event + Lockout Compressors, No Pump Down (enabled only if at least one compressor is on; auto-reset depends on input status)
Comp Lock PD	Event + Compressor(s) Disabled w/ Pump Down
Enable FC	Forces Free-Cooling to On
HTRJ VFD	Activates the HEAT REJ VFD ALARM; no other function
HTRJ TVSS	Activates the HEAT REJ TVSS ALARM; no other function
FIRE ALARM	Event + Shuts The Unit Down
2^{ND} SETPOINT	No Event But Switches To The Second Setpoint
NO POWER	Event + Disables Unit
LSI	Event + Activates Humidifier Problem Alarm And Stop Filling Bottle When Full
COND 1 FAIL	Event Only
COND 2 FAIL	Event Only
D-SCROLL RED	Event + Reduces The Requested Compressor Capacity By 20%
SWAP VALVE	No Event -active X Valve Closes And Y Opens / Inactive Y Closes And X Opens
EC FAN FAULT	Event + Sets Analog Output To 10v
ECO AIRFLOW	Event + Reduces Economizer Airflow
DAMPERSWITCH	Damper + End Switch
POWER A	Event Only
POWER B	Event Only

3.10.3 Analog Inputs—Liebert CW™ and Liebert DS™ Air-Cooled Units

The Liebert iCOM allows an external sensor or analog device to be connected, scaled and viewed on the Liebert iCOM large display for Liebert CW and Liebert DS air-cooled units only. These external devices require optional analog input connections that can be installed on new units at the factory or added to existing units in the field. The option provides the electrical connection from the Liebert iCOM control board to the required factory-supplied plug, harness and terminal strip. For parts, contact Liebert Services at (800) 800-543-2778. If a Liebert CW or Liebert DS air-cooled unit is equipped with this option, then a 0-10VDC, 0-5VDC or a device such as a sensor or a damper can be connected to terminals 41 and 42, 43 and 44, 45 and 46 or 47 and 48. See **Table 11** for analog input availability.

Table 11 Number of analog inputs

Unit Type	Number of Analog Inputs
Liebert CW with MBV	4
Liebert CW with 3P (Stem Valve)	3; one used for valve feedback
Liebert DS Air-Cooled (DX)	2; two used for suction pressure management

NOTE
This option is not available on fluid-cooled units. Fluid-cooled units use all four analog inputs for low and high refrigerant pressure management.

NOTE
The analog inputs must be configured with the large display. The small display can only view them.

Follow the settings illustrated in **Figure 62** and **Table 12** to set the input type based on the sensor output being used. The default analog input is 0-5VDC. Only properly trained and qualified service technicians should change the analog input type.

Figure 62 Analog connection control board switch

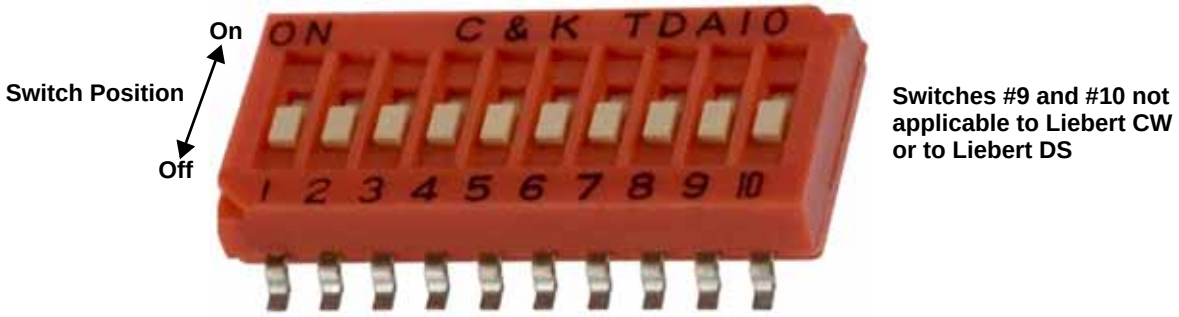


Table 12 Analog connection control board switch position

Analog Input #		Input #1		Input #2		Input #3		Input #4	
Control Board Switch Number		1	2	3	4	5	6	7	8
Analog Input Device Value	0 to 10VDC	Off	Off	Off	Off	Off	Off	Off	Off
	0 to 5VDC	On	Off	On	Off	On	Off	On	Off

Switches #9 and #10 not applicable to Liebert CW or to Liebert DS.

3.10.4 Liebert iCOM-DO™

The Liebert iCOM-DO is an optional discrete output relay card that can be connected to a Liebert iCOM for providing dry alarm contact outputs for monitoring systems. The Liebert iCOM-DO is a direct replacement of the Liebert ENV-DO™ card that was supported on previous Liebert control systems. The Liebert iCOM-DO allows simultaneous use of the Liebert IntelliSlot cards as the Liebert iCOM-DO communicates over the CANbus network instead of the IGMnet interface.

Liebert iCOM-DO card provides up to 15 configurable alarms through relay outputs. For the ratings and additional data, refer to the Liebert iCOM-DO manual, SL-28096. Each alarm output has three terminals: N/C, N/O and common. The Liebert iCOM-DO setup can be found in the Service, Liebert iCOM-DO menu (large display only). The Liebert iCOM-DO is pre-configured and its present is automatically detected by the Liebert iCOM once it is connected to the CANbus line. The default alarm configuration matches the original Liebert ENV-DO card alarm mapping.

For information on setting up this relay card, refer to the Liebert iCOM-DO manual, SL-28096, available at the Liebert Web site: **www.liebert.com**

Table 13 Alarm mapping

#	Alarm	Notes
01	Cooling Status	The output is active when cooling is on.
02	Heating Status	The output is active when heating is on.
03	Humidifying Status	The output is active when humidification is on.
04	Dehumidifying Status	The output is active when dehumidification is on.
05	High Temperature	The output is active when high temperature alarm is active.
06	High Humidity	The output is active when the high humidity alarm is active.
07	Low Temperature	The output is active when the low temperature alarm is active.
08	Low Humidity	The output is active when the low humidity alarm is active.
09a	High Head Pressure C1	The output is active when the compressor 1 high head pressure alarm is active.
09b	High Head Pressure C2	The output is active when the compressor 2 high head pressure alarm is active.
10	Loss of Airflow	The output is active when a loss of air flow alarm is active.
11	Change Filters	The output is active when a change filter alarm is active.
12	Water Alarm	The output is active when a water alarm is active.
13	Condensing Pump Alarm	The output is active when the condensing pump alarm is active.
14	Glycool Status	The output is active when is free-cooling active.
15	Unit On	The output is active the unit is turned On.

An event is active as long as it is not acknowledged. Once acknowledged, an alarm remains active until the event situation is not true anymore and the event is reset by the board, which switches Off the red LED and the general alarm relay.

3.10.5 Possible Event Notifications

Table 14 lists examples of alarms and warnings that can be configured for a cooling unit. When any of these occur, they will appear on the Liebert iCOM Status menu and will be recorded in the Liebert iCOM Event log.

Table 14 Event notifications—large or small display

Event	Type
COMP 1 HRS EXCEEDED	WRN
COMP 2 HRS EXCEEDED	WRN
EL HEAT1 HRS EXCEEDED	WRN
EL HEAT2 HRS EXCEEDED	WRN
EL HEAT3 HRS EXCEEDED	WRN
FC HRS EXCEEDED	WRN
GENERAL ALARM	ALM
GLYCOL TEMP SENSOR	WRN
HIGH CW TEMP	WRN
HUM HRS EXCEEDED	WRN
HUMIDIFIER PROBLEM	—
HW/HG HRS EXCEEDED	WRN
LOSS OF CW FLOW	ALM
NETWORK FAILURE	WRN
ON-OFF KEY DISABLED	WRN
POWER ON	MSG
POWER OFF	MSG
ROOM SENSOR FAILURE	ALM
UNIT DISABLED	MSG
UNIT HRS EXCEEDED	WRN
UNIT ON	MSG
UNIT OFF	MSG
UNIT DISABLED	MSG
UNIT SHUTDOWN	MSG
UNIT SYNCHRONIZATION	MSG
SENSOR A FAILURE	WRN
SLEEP MODE	MSG
STANDBY MODE	MSG
SUPPLY SENSOR FAILURE	WRN

3.11 Wellness—Next Maintenance Calculation

The next maintenance calculation, as well as the diagnostics feature, will help keep the cooling unit running at peak performance to ensure minimum component stress and maximum reliability. The diagnostics will help the service engineer evaluate the unit's operation since the last maintenance.

3.11.1 Calculating Next Maintenance and Diagnostics

If the unit includes any of the following components, they are included in the calculation:

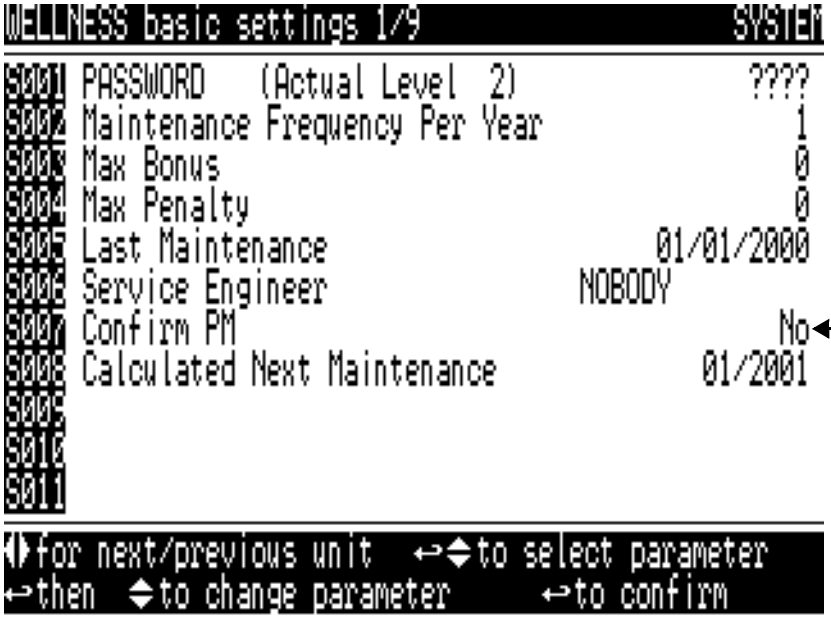
- Fan(s)
- Compressor 1
- Compressor 2
- Electric Heaters
- Humidifier

For each component, the next maintenance will be calculated from the following parameters:

- Standard service interval (1, 2 or 4 times a year) (to be set)
- Working hours (counted)
- Number of starts (counted)
- Average running time (calculated)
- Optimum number of starts per hour (to be set)
- Maximum number of starts per hour (to be set)
- Maximum bonus to enlarge time to next maintenance (to be set)
- Maximum penalty to reduce time to next maintenance (to be set)

Calculating Unit Wellness

Figure 63 Wellness—Basic settings screen, page 1 of 9



Change to YES to confirm that preventive maintenance has been performed.

To confirm that preventive maintenance has been performed:

1. Go to line Service>Wellness>basic settings>S007 and select YES.
2. Press the enter button. This will confirm the preventive maintenance. Line S005 will change to the date of the preventive maintenance was performed. Line S008 will update to show the next calculated maintenance date.

Liebert iCOM keeps tabs on the condition of a cooling unit, determining its wellness and projecting when service will be needed, for the entire unit as well as for individual components. This assists in scheduling maintenance calls and helps pinpoint components likely to require service.

Liebert iCOM displays a graphic for needed maintenance. It begins with the standard maintenance interval—12 months, six months or three months—and adjusts that based on its calculation of components' wellness.

To calculate wellness, Liebert iCOM keeps a running total of component working hours and the number of times it has been started. Liebert iCOM relates that data to the optimum/maximum starts per hour. Accordingly, Liebert iCOM will increase or decrease the time before the next service call.

The more frequently a component starts, the sooner it is likely to need maintenance. If, for example, a unit's fan runs continuously, but it's compressor starts and stops often, Liebert iCOM records that and calls for maintenance based on the compressor's wellness factor.

Alarms and warnings, such as clogged filters or high or low pressure, reduce the time till the next maintenance to zero. If the alarm is cleared and reset, Liebert iCOM recalculates wellness. It begins with the pre-alarm maintenance time and factors in the alarm.

Parameters for Next Maintenance Calculation

General Maintenance Settings

- **Maintenance Frequency**—can be set as one to 12 months or to zero, which disables maintenance calculation
- **Max. Bonus**—increases the time to next maintenance with the set value, if all components run optimally (number of starts, average running time)
- **Max. Penalty value**—decreases the time to next maintenance with the set value, if some components run in non-optimum way (number of starts, average running time)
- **Last Maintenance**—date can be set from service-engineer; informational
- **Service-Engineer**—name of the service engineer; editable
- **Reset**—puts all counters of all components, such as (motor, compressors, heaters and humidifier), at zero and starts a new maintenance calculation (reset to be done after maintenance)

Fans / Heaters / Humidifier Settings and Diagnostics

- Number of starts and Working hours are counted separately since the last maintenance. Total working hours can be read in the standard working hours window (customer window).
- Average Working Hours is the calculation, resulting from starts and working hours.
- Starts per Day Optimum is the number of starts considered as optimum.
- Starts per Day Worst is the number of starts considered as hunting (worst case).
- Number of Alarms counts the alarms, happened between two service intervals.
- Actual Bonus is calculated from number of starts and average working time. Can be positive (bonus) or negative (penalty). This value influences the time remaining to the next maintenance.

Compressor 1 / 2 Settings and Diagnostics

- Number of starts and Working hours are individually counted since the last maintenance. Total working hours can be read in the standard working hours window (customer window).
- Average Working Hours is the calculation, resulting from starts and working hours.
- Starts per Day Optimum is the number of starts considered as optimum.
- Starts per Day Worst is the number of starts considered as hunting (worst case).
- Number of HP Alarms counts the high-pressure alarms, happened between two service intervals.
- Number of LP Alarms counts the low-pressure alarms, happened between two service intervals.
- Number of TH Alarms counts the thermal protection alarms, happened between two service intervals.
- Actual Bonus is calculated from number of starts and average working time. Can be positive (bonus) or negative (penalty). This value influences the time remaining to the next maintenance.

4.0 TEAMWORK

Unit-2-Unit (U2U) communications via a private network will allow the following functions to be placed into operation when the requirement exists. The user must install the correct hardware (see **5.0 - Installing a Liebert iCOM Unit-to-Unit Network**) and properly program the units for the selected functionality.

The Liebert iCOM network can perform the following functions:

The **Teamwork Mode** functions allow for multiple stages of cooling/heating and humidification/dehumidification. Teamwork Mode can be used to prevent environmental units from "fighting," where one environmental unit might be cooling while another unit is heating.

The **Standby (Lead/Lag)** function allows one or more units to be set as "Running" and "Standby" for activation in case of an alarm. This function also allows the units to be programmed in a rotation to help ensure "Standby" unit operation.

The **Cascade Operation** function allows additional units to be staged-on based on the temperature or humidity requirement.

4.1 Compatibility With Previous Liebert iCOM Controls

Extensive upgrades to the Unit-to-Unit communication software prevent Liebert iCOM controls with PA2.01.029.04R software from being compatible with Liebert iCOM controls that have earlier versions of Liebert iCOM software. Liebert iCOM controls with PA2.01.029.04R software will not communicate with Liebert iCOM controls with PA**1**.XX.XXXSTD software.

Customers who have Liebert iCOM controls with the PA**1**.XX.XXXSTD software and who need additional Liebert iCOM units can:

- Purchase new units with the previous software installed at the factory
- Purchase new units with the PA2.01.029.04R software and have a properly trained and qualified technician downgrade the units to PA1.04.043.STD
- Have a properly trained and qualified technician upgrade the older unit(s) with PA2.01.029.03R

For further information, contact your local Emerson representative.

4.2 Teamwork Modes

Groups of cooling units connected to a network can be set up to work together in any of these teamwork modes:

- No Teamwork
- Teamwork Mode 1
- Teamwork Mode 2
- Teamwork Mode 3 (software Rev. PA2.00.05R or higher required)

All Liebert iCOM-controlled cooling units on a network must be set to run in the same teamwork mode.

4.2.1 Application of Teamwork Modes

All units in a network will run in the same Teamwork Mode.

- **No Teamwork**: Multiple zones in one room
- **Teamwork Mode 1**: Balanced load (small groups of units inside the same environment)
- **Teamwork Mode 2**: Unbalanced load (large rooms, not all units will have the same load) (work well for most applications)
- **Teamwork Mode 3**: Allows the cooling capacity (Supply Sensor) to operate as a local control by removing only the amount of load required to maintain the discharge air temperature at each unit. This allows for an unbalanced room load while maintaining a consistent discharge air temperature. The fan speed is controlled by the remote rack sensors (return, supply, under floor static pressure) of all units, providing a controlled delivery method of the air to the cold aisle. In raised floor applications, Liebert iCOM units will share sensor information to achieve even under-floor air distribution. This distribution is achieved by operating all fans in parallel, which will also yield the greatest energy efficiency.

4.2.2 No Teamwork

All cooling units work independently, responding to their own sensors. Standby function and unit rotation are possible, but cascading is not (see **Standby and Cascade on page 90**). Autoset will not adjust the proportional band in this mode.

4.2.3 Teamwork Mode 1

Teamwork Mode 1 works best in small rooms with balanced heat loads. The return temperature and humidity sensor readings of all units in operation (fan on) are averaged by the master unit, Unit #1, and used for control. The master unit will send the operating requirements to all operating units according to unit numbers, rotated by one unit every 24 hours.

In this teamwork mode, most of the parameters are shared; if set in any one of the units, all other units will follow with the same settings. AutoSet will adjust the proportional band in Teamwork Mode 1, see **3.2.1 - Temperature Proportional Band**.

The master unit evenly divides the system proportional band among the number of available units. Each unit will receive instruction on how to operate from the master unit based on how far the system deviates from the setpoints.

The number of available units is calculated like:

- In non-standby configuration: all units with fan on
- In typical standby function (no cascade): all units with fan on
- In cascade mode: all units that could operate (no alarm, which forces the unit to switch Off, unit not switched Off, etc.)

NOTE

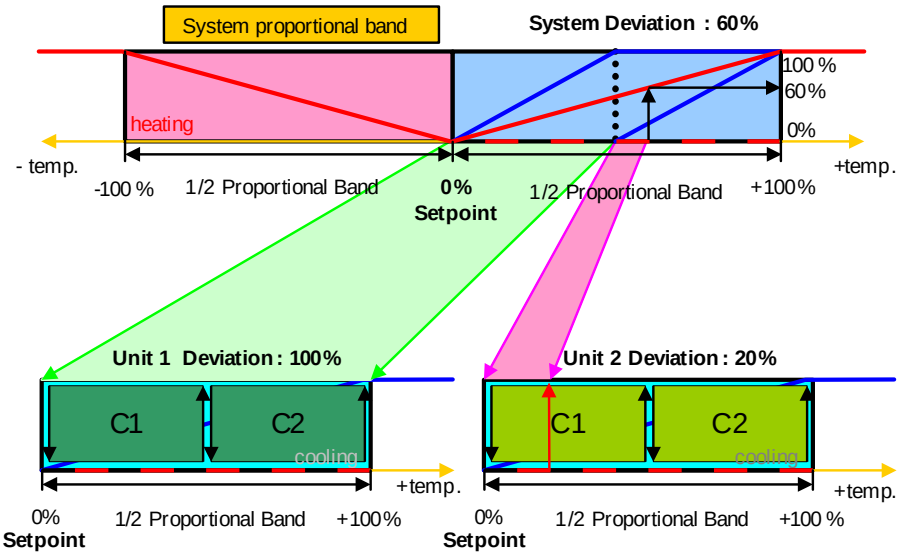
1. *Proportional actuators (chilled water valves and free-cooling valves) are driven in parallel.*
2. *Dual-cool and free-cooling units cannot be set in Teamwork 1 if compressors and free-cooling valves are set for simultaneous operation.*
3. *On free-cooling or dual-cool units where simultaneous operation is set to No, chilled water valves ramp in parallel. If free-cooling is not possible for one unit, the group will switch to compressor operation. Compressor staging may work serially or in parallel depending on compressor type. See below for compressor ramping.*
   - *The compressors will ramp in parallel if all units in the group are digital scroll.*
   - *Compressor staging will be done serially if all the units in the group are four-step, two-step semi-hermetic or standard scroll.*
   - *Compressor staging will be done in parallel if there is a mix of digital scroll compressors with four-step, two-step semi-hermetic or standard scroll.*
4. *Low limit and dehumidification are managed from each unit independently.*

Figure 64 shows how two cooling units work together in Teamwork Mode 1,staging compressors serially. Since Unit 1 and Unit 2 are available to operate, the master unit, Unit 1, collects the average or maximum (based on S804 “Teamwork is based on” programming) temperature and humidity sensor readings from each unit. Settings in S804 “Teamwork is based on” programming determines whether the unit uses the average or maximum temperature and humidity sensor.

The master unit determines that a 60% call for cooling is required for the system. Since there are two available cooling units, each unit makes up half of the system proportional band; Unit 1 handles 0-50% system call for cooling and Unit 2 handles 51-100%. For every 1% system call for cooling, each unit provides 2% of its total cooling capacity.

The 60% system call for cooling exceeds the 50% Unit 1 can provide, so Unit 1 operates at full capacity. The remaining 10% system call for cooling (60% - 50% = 10%) is handled by Unit 2. Unit 2 responds by operating at 20% cooling capacity (50% - 10% = 40%).

Figure 64 Teamwork Mode 1, serial staging



4.2.4 Teamwork Mode 2

Teamwork Mode 2 is designed to prevent units within a group from working against each other or "fighting." It is best applied in large rooms with unbalanced heat loads. In Teamwork Mode 2, all parameters are shared equal to Mode 1, and Unit #1 averages all of the available unit sensor readings on the network to define whether there is a cooling, heating, dehumidification or humidification request.

If there is a cooling request, all units are released to start cooling resources according to their own temperature readings; heating is disabled for all units and vice versa. Same for humidity control.

If the network average would ask for 0% proportional band, the most demanding request (highest or lowest temperature of all units, highest or lowest humidity of all units) would be used to define the operation to be performed.

Teamwork Mode 2 does not rotate; unevenly distributed working hours to be expected. Autoset will not adjust the proportional band in this mode.

NOTE

In Teamwork Mode 2, all units must have the same setpoints. The units' proportional band, deadband and related settings may differ.

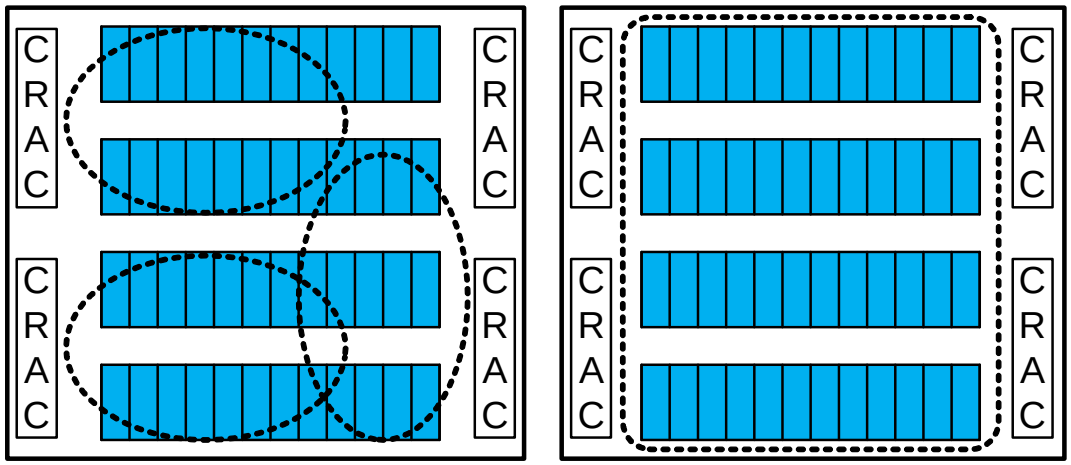
4.2.5 Teamwork Mode 3 (Optimized Aisle)

Teamwork Mode 3 can be selected when the units are set to operate in Optimized Aisle Control mode and have been connected in a unit-to-unit network. Teamwork provides coordination between the units that will prevent "fighting" by not allowing units to operate in conflicting modes of operation at the same time by selecting which mode to operate within based on the average of the collective unit sensors (Cooling vs. Heating and Humidifying vs. Dehumidifying). For additional details, see **3.9 - Liebert Optimized Aisle Control**.

Teamwork Mode 3 allows the cooling capacity (Supply Sensor) to operate as a local control by removing only the amount of load required to maintain the discharge air temperature at each unit. This allows for an unbalanced room load while maintaining a consistent discharge air temperature. The fan speed is controlled by the remote rack sensors of all units, providing a controlled delivery method of the air to the cold aisle. In raised floor applications, Liebert iCOM units will share sensor information to achieve even under-floor air distribution. This distribution is achieved by operating all fans in parallel, which will also yield the greatest energy efficiency.

Figure 65 shows the difference in both under-floor air distribution and energy consumption when Variable Fan speed and Teamwork Mode 3 are applied to the Liebert cooling units. The example on the left is using the standard standby configuration; the example on the right is utilizing Teamwork Mode 3. The units below are assuming that the fan power consumed at each unit is 8.1kW when operating at 100%.

Figure 65 Teamwork Mode 3—Fixed speed vs. variable speed


CRAC
CRAC
CRAC
CRAC
CRAC
CRAC
CRAC
CRAC
Fixed Speed
Variable Speed
Three Units On—One Unit in Standby
Fans must operate at 100% to meet demand
3 Units x 8.1kWh = 24.3kW per hour
Area within dotted lines is being cooled by CRAC units controlled by Liebert iCOM
Four Units Operating Together
Fans can operate at 75% to meet demand
4 Units x 3.43kWh = 13.72kW per hour

Cascade

When data center environments require the cooling equipment to modulate from very low loads to the full design load, iCOM can coordinate unit capacity and unit activation in accordance with the Teamwork Mode 3 operation described above. The Liebert iCOM optimized aisle controlled units that are placed into Standby mode will activate as the room environment demands more cooling capacity. iCOM will monitor the rack sensors and current operating state of each unit to determine when to activate a standby unit.

To provide the most efficient operation from a system perspective, the Liebert iCOM will first ramp the operating units fans and chilled water valve to compensate for the increased heat load. Once the operating units have reached a set fan speed, the supply compensation (see **Figure 105**) may be activated to determine if a lower supply temperature can compensate for the load increase. Once the supply compensation routine has reached its threshold then the Liebert iCOM will activate a standby unit within the group.

Lead / Lag - Failure Scenarios

When redundancy configurations are required, the Liebert iCOM unit-to-unit network has built in fail-over conditions that require no building management interaction. The first and possibly most common failure scenario is a single unit or component failure. In this situation, the Liebert iCOM will automatically activate a standby unit in the place of the failed unit.

Unit-to-Unit and sensor failure scenarios have also been programmed into the Liebert iCOM controller. For example if the remote sensors fail at the unit level, the unit will continue to operate using the other unit's remote sensor values. If all remote sensors fail, then the fan speed will begin to operate from the supply sensor. If the supply air sensor fails, then the unit will default to 100% fan and cooling capacity. In the event of a unit to unit network switch failure, each unit will operate from its sensor network.

If one unit becomes disconnected from the network, the disconnected unit will run independently according to the local sensor readings. If U2U address No. 1 becomes disconnected from the group, each unit will run independently according to the local sensor readings.

Application and Configuration of Rack Sensors

The inlet rack temperature sensors should be placed on a rack that is within the area of influence of the connected cooling unit. The following floor plan shows how the sensors should be placed. The sensors and units are color matched to show the location of each unit's sensors. This particular floor plan shows how the sensors can be interlaced with one another to provide redundancy of the different unit's sensors. Remember that the sensor data from each unit is shared at the teamwork level so placement of the sensors is flexible with your specific application. So even when one unit fails the other units are still able to react based on the failed units sensors.

Each unit can connect up to 10 sensor modules with each module allowing for two temperature probes for a total of 20 temperature readings per cooling unit. Each of the two probes allows for 6 feet of distance between the temperature probe and the module. This provides the flexibility to either place both temperature sensor probes at the top of two different racks or to place one sensor probe in the middle of the rack and one at the upper two thirds of the rack. Sensors can be placed in other locations like the hot aisle but should be set as a reference sensor and not a controlling sensor. This will allow the sensor to be monitored by the Liebert iCOM display and building management system but will not affect unit operation.

The rack sensors that are set to control have the flexibility to be set in different averaging schemes. There are three different levels of sensor calculations; at the sensor level, at the unit level and at the system level (unit to unit network). At the sensor level, the two probes on each rack sensor can be set to average or take the maximum value of the two sensors. The setting at the unit level allows the operator to select how many of the controlling sensors are averaged. If the unit has 10 rack sensors connected for control, the operator can elect to average 1 through 10 of the sensors. For example, selecting 3 sensors to average would use the 3 highest sensor readings out of the 10 possible sensors. Even though only three sensors are being used for the average, all 10 are being dynamically monitored with Liebert iCOM's rack sensor scanning routine. This means that the three highest sensors today might not be the three highest sensors tomorrow.

The system level calculation provides the same level of flexibility as described above for the unit level sensor configuration. Providing this level of configuration at the unit and system level coupled with the rack sensor scanning allows the units and system to be setup for a variety of applications, including no containment, end containment and total containment. In addition it also allows Liebert iCOM to adjust airflow and cooling capacity as the environment changes or if the heat load shifts, increases or decreases.

Figure 66 Remote sensors

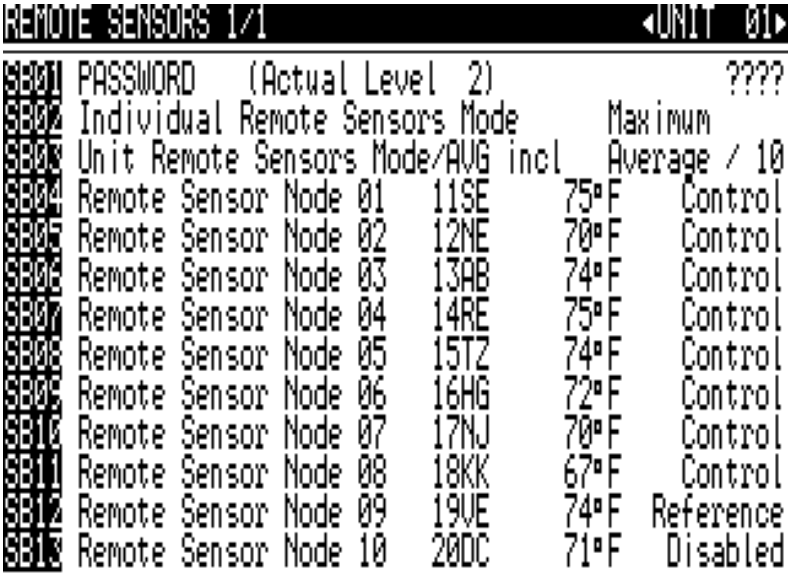
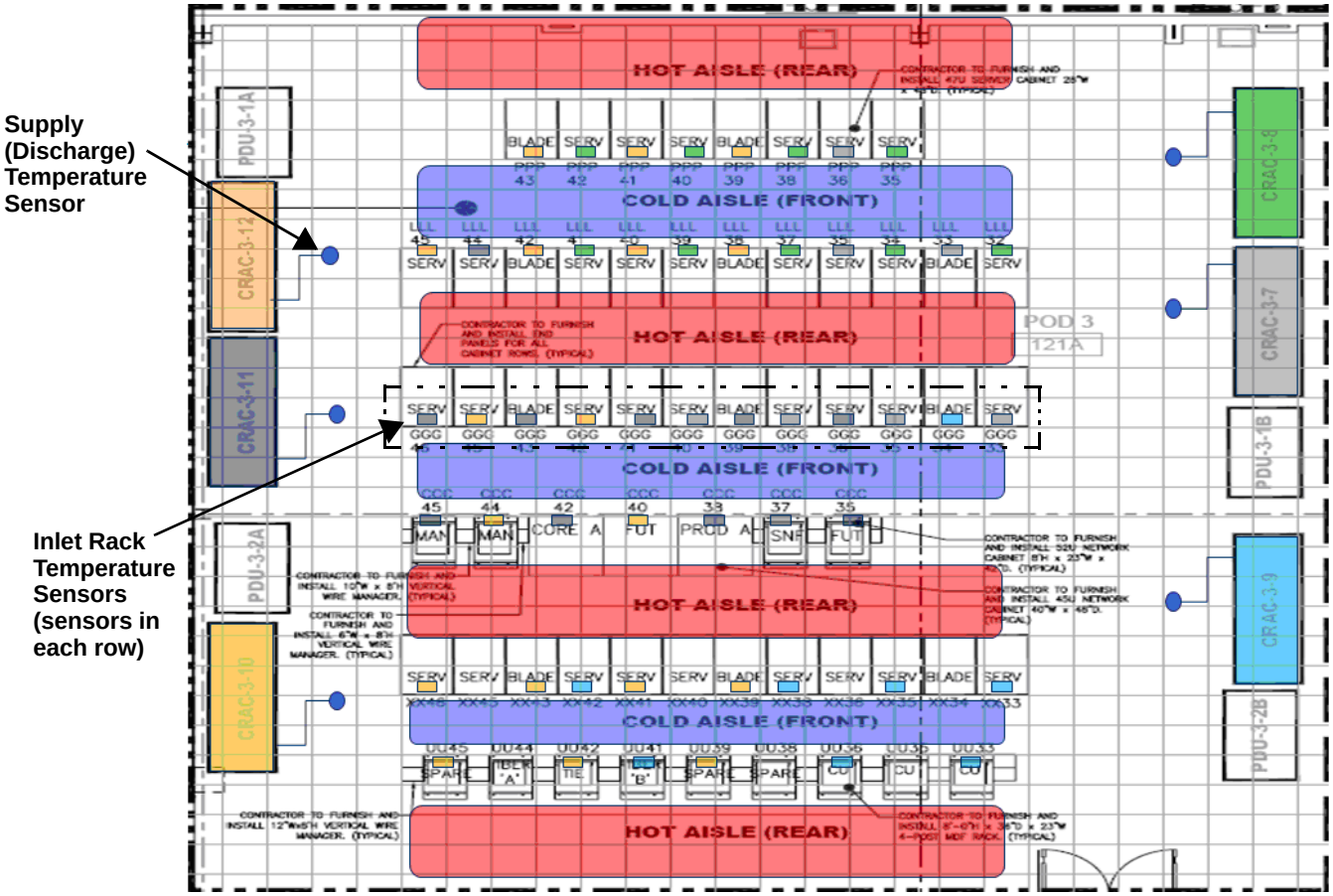

REMOTE SENSORS 1/1
◂UNIT 01▸
SB01 PASSWORD (Actual Level 2) ????
SB02 Individual Remote Sensors Mode Maximum
SB03 Unit Remote Sensors Mode/AVG incl Average / 10
SB04 Remote Sensor Node 01 11SE 75°F Control
SB05 Remote Sensor Node 02 12NE 70°F Control
SB06 Remote Sensor Node 03 13AB 74°F Control
SB07 Remote Sensor Node 04 14RE 75°F Control
SB08 Remote Sensor Node 05 15TZ 74°F Control
SB09 Remote Sensor Node 06 16HG 72°F Control
SB10 Remote Sensor Node 07 17NJ 70°F Control
SB11 Remote Sensor Node 08 18KK 67°F Control
SB12 Remote Sensor Node 09 19VE 74°F Reference
SB13 Remote Sensor Node 10 20DC 71°F Disabled

Figure 67 Sensor positioning



4.2.6 Hardware Setup

The Liebert Optimized Aisle Control requires:

- A temperature/humidity sensor in the cold aisle and connected to the Liebert iCOM via CAN bus. This can be done by:
  - Moving the return temperature sensor from the cooling unit to the cold aisle with a longer CAN Bus cable
    —OR BY—
  - Obtaining a remote temperature sensor and addressing it to operate as the return temperature sensor.
- An additional supply temperature sensor placed under the raised floor.

4.3 Liebert Optimized Aisle Rack Sensor Installation

Each 2T sensor has two wires leaving the housing with temperature sensors on the end of each wire; see **Figure 68**.

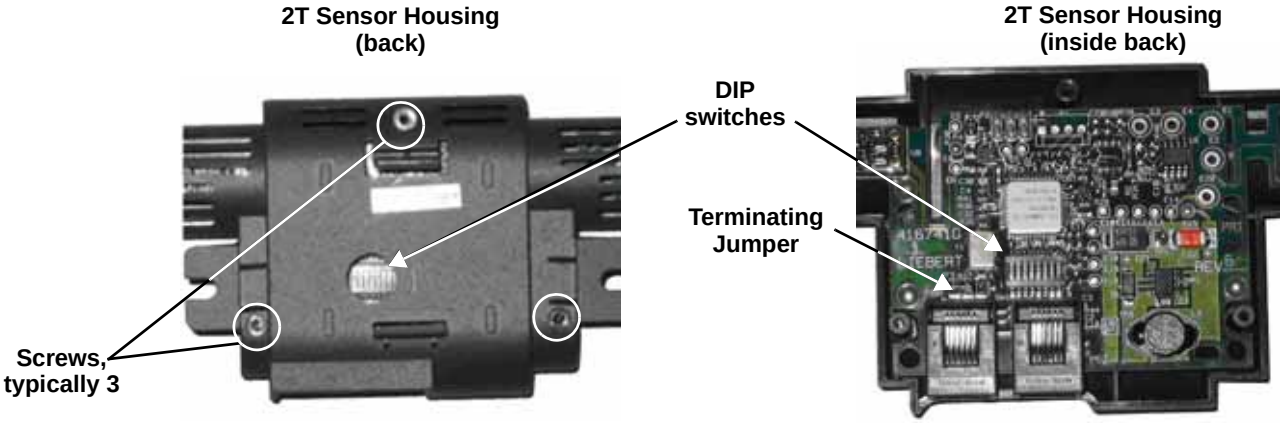
Figure 68 2T rack sensor

Sensors shown may differ depending on equipment installed

To install the Optimized Aisle Control 2T Sensor Array:

1. Set DIP switch settings for 2T sensors.
2. Terminate the final sensor on the CANbus link.
3. Install 2T sensors on racks to be monitored.
4. Install CANbus cable between 2T sensors.
5. Replace CANbus cable between the Liebert iCOM display and the Liebert iCOM main board in electrical panel with grounded CANbus cable.
6. Install grounding ring connector in electrical panel and connect ground to CANbus cable.

Figure 69 Setting DIP switches for 2T sensors



4.3.1 Tools Required for Installation

- Small, non-conductive tool for setting control DIP switches
- Medium flat-head screw driver for opening electric panel protective dead-front.
- Cutting tool to trim cable ties
- Small Phillips-head screwdriver to open 2T housing

4.3.2 DIP Switch Settings

The individual 2T rack sensor must be given a unique address on the CANbus cable run to the associated Liebert CW™ unit. DIP switches are used to give the 2T sensor its unique address. It is important to confirm that the DIP switches have been set correctly using the below table. Although it is not required, it is recommended that the DIP switch sensor number settings correspond to the number of 2T sensors on the CANbus run. For example, if there are only four 2T sensors used for a particular Liebert CW unit then the individual DIP switch settings should correspond to address #1, #2, #3 and #4. If the DIP switches are not set correctly, the control will not operate properly.

Figure 70 DIP switches in 2T sensors

Switch Up = ON

Switch Down = OFF

Table 15 DIP switch settings

2T Sensor #	DIP switch Position							
	1	2	3	4	5	6	7	8
1	Off	Off	On	Off	On	Off	Off	Off
2	On	Off	On	Off	On	Off	Off	Off
3	Off	On	On	Off	On	Off	Off	Off
4	On	On	On	Off	On	Off	Off	Off
5	Off	Off	Off	On	On	Off	Off	Off
6	On	Off	Off	On	On	Off	Off	Off
7	Off	On	Off	On	On	Off	Off	Off
8	On	On	Off	On	On	Off	Off	Off
9	Off	Off	On	On	On	Off	Off	Off
10	On	Off	On	On	On	Off	Off	Off

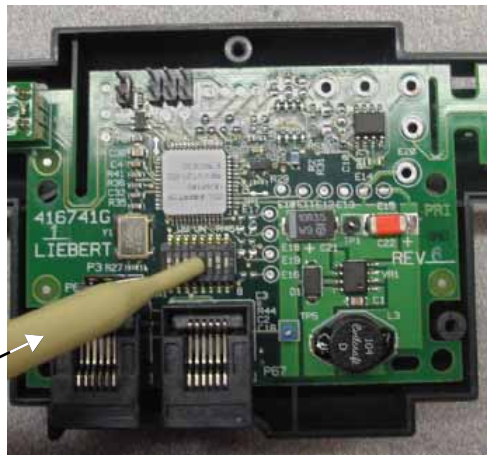
Set 2T Rack Sensor Identities - DIP Switch Settings

1. Confirm that the DIP switches are set correctly for all 2T sensors.
2. Apply numbered stickers to the sensor housings, corresponding to sensor chain position.
3. Based on the sensor number, use the included DIP switch tool to set the DIP switches according to **Table 15**. If the settings are difficult to make through the opening in the housing or if the hole is not present, open the case by removing the three Phillips-head screws. Reassemble housing once the settings are made.

Figure 71 Setting 2T Sensor DIP Switches

2T sensor housing DIP switch hole

Non-conductive DIP switch tool



2T sensor housing case opened

NOTE

Use included DIP switch tool (or similar tool). DO NOT insert any metal object into the sensor case.

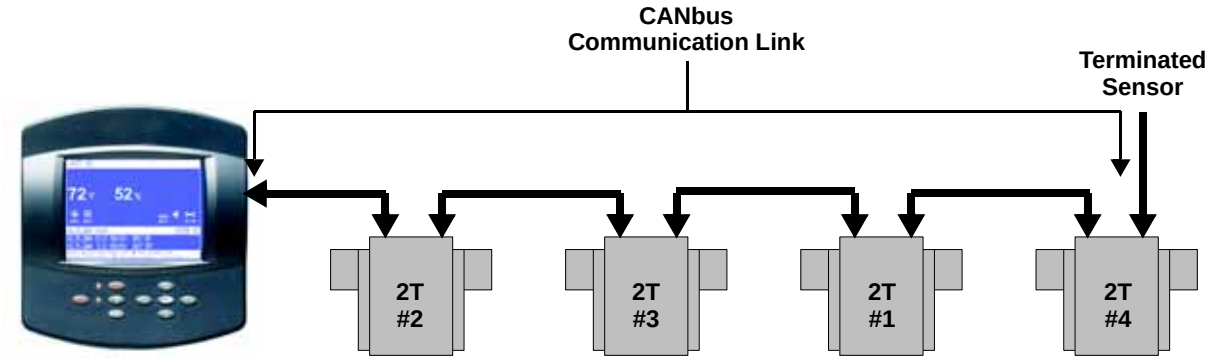
4.3.3 Terminate the Final Sensor on the CANbus Link

2T Sensors do not need to be addressed in numerical order. For example, if four sensors are purchased, they can be connected as shown in **Figure 72**.

Figure 72 2T sensor arrangement and termination

Liebert iCOM → Sensor #2 → Sensor #3 → Sensor #1 → Terminated Sensor #4

The key is to have the last sensor in the chain terminated.



In the above example, if additional sensors are added to extend the existing sensor network, Sensor #4 must be unterminated. The additional sensors can be connected. The last sensor in the extended network must be terminated.

Terminating Last 2T Sensor

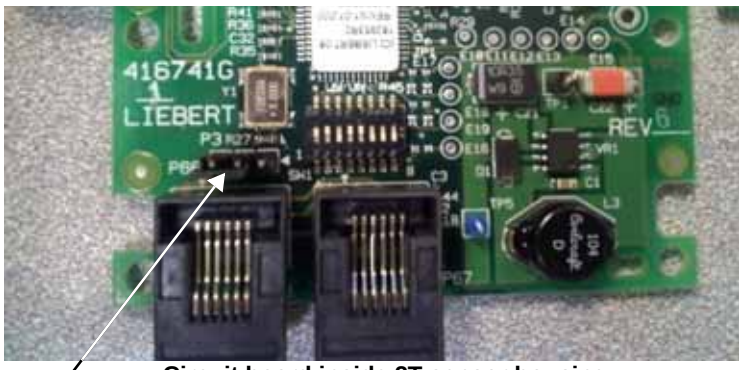
The last 2T sensor on the network, which can be identified by only having one CAN cable plugged into it, must be terminated. All other 2T sensors on the network must remain unterminated. The following pictures show the location of the jumper that determines if the 2T sensor is terminated.

To terminate a 2T sensor:

1. Open the sensor's case by removing the three screws that hold it together.
2. Pull the black jumper off the circuit board from Pins 1 and 2 (see **Figure 73**).
3. Install the jumper on Pins 2 and 3.
4. Reassemble the sensor housing.

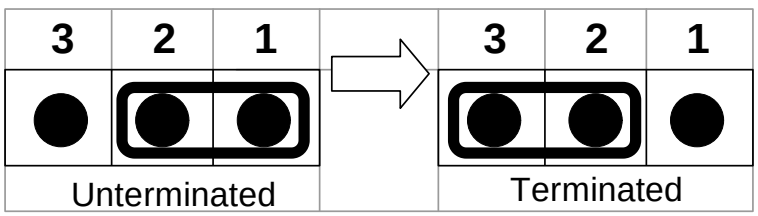
Figure 73 Termination jumper setting

Circuit board inside display housing



Circuit board inside 2T sensor housing

Termination Jumper in the Terminated Position



4.3.4 Install 2T Sensors on Racks to be Monitored

Both temperature sensors attached to a 2T sensor housing are to be installed on the same rack. The sensor can be attached to the inside or outside of the rack's front door.

- One temperature sensor is to be attached near the top of the rack's front door by using a cable tie to secure the wire to the perforation (approx. 12 inches [305mm] from the top). Do not wrap a cable tie around the actual sensor on the end of the wire. This sensor will monitor for hot air wrapping over the top of the rack from the hot aisle.
- The other temperature sensor is to be attached to the rack's front door, centered in front of the heat-generating equipment that will be drawing in air.
- If the rack is completely filled with equipment, attach the sensor to the middle of the door as determined by both width and height.
- If the rack is partially filled with equipment, locate the sensor in the center of the equipment on the front door.
- Do not:
  - Install a sensor in the hot aisle.
  - Leave a sensor coiled on top of or inside the rack.
- With the temperature sensors in place, neatly route the wires up the rack door and into the rack using the supplied cable ties. Be sure to leave an appropriate amount of slack in the cable to allow the rack door to open and close without binding or pinching the wires.
- Affix the 2T sensor housing to the rack using the supplied hook-and-loop fastener. It is recommended that the housing be installed in an easily accessible space with the sensor number label visible in case the housing needs accessed at a later time.

Repeat this process until all sensors have been installed.

4.3.5 Install CANbus Cable Between 2T Sensors

No special considerations are required for cable up to 150 ft. (45m) long. A CANbus isolator (Liebert Part # 301275G1S) is required for cables between 150 ft. and 300 ft. (45m and 91m). Contact the factory if using CANbus cables longer than 300ft (91m).

The CANbus cable network requires a ground wire. The grounds are connected at each 2T sensor, the rear of the front display and must be terminated to a field-installed ground ring in the low-voltage electrical panel. **Figure 75** show the connected grounds on a 2T sensor. The illustration on the right in **Figure 75** shows the rear of the front display with the factory-installed CANbus cable between the display and main board replaced with a 6-foot (1.8m) grounded CANbus cable (Part # 300157G1).

Follow these guidelines when routing CANbus cable to ensure reliable communication.

- Use approved hangers, such as telephone wire/RG-6 coaxial wired hangers; do not secure cables with any method that might damage them.
- Limit bends to less than four times the diameter of the cable.
- Avoid deforming cables when securing in bundles and when hanging them.
- Keep cables away from devices that may introduce interference, such as high-voltage wires, machines, fluorescent lights, and electronics. High-voltage sources must be at least 12 inches (305mm) from CAN wires.
- Avoid stretching cables.
- Ensure that cables have the correct pin-outs. Mismatching wire pins at the RJ12 connection will damage the CAN device.

Cables may be purchased from your local Emerson distributor or made on site. **Table 16** lists part numbers for manufactured and tested CANbus cables.

Table 16 Liebert CAN cable part numbers

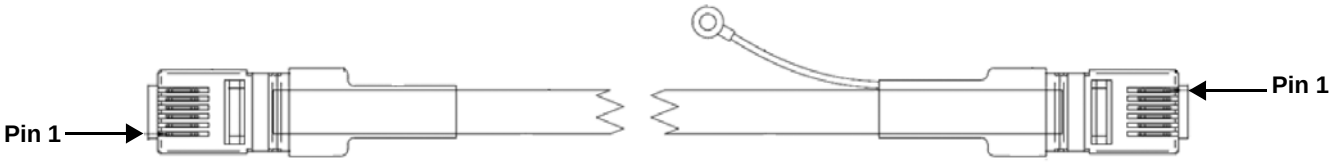
Liebert PN	Description / Length
300157G1	WH REMOTE CAN P66/P67 6'
300157G2	WH REMOTE CAN P66/P67 10'
300157G3	WH REMOTE CAN P66/P67 20'
300157G4	WH REMOTE CAN P66/P67 30'
300157G11	WH REMOTE CAN P66/P67 15'
300157G13	WH REMOTE CAN P66/P67 40'
300157G14	WH REMOTE CAN P66/P67 50'
300157G5	WH REMOTE CAN P66/P67 60'
300157G16	WH REMOTE CAN P66/P67 80'
300157G17	WH REMOTE CAN P66/P67 100'
300157G7	WH REMOTE CAN P66/P67 120'

If making cables, follow these specifications:

- RJ12-6P6C long-body connectors (two per cable)
- 24 gauge, six-conductor, three twisted pair cable (minimum eight twists per foot)
- Low capacitance, 15 pF/FT or less
- Braided shield or foil shield with drain wire
- Shield wired to ground at indoor unit
- Plenum rated NEC type CMP, if required by national or local codes

Caution must be used when making CAN cables because communication transmit/receive and DC power wires are both part of this communication connection. Mismatching wire pins at the RJ12 connection will damage the CAN device. Extreme caution should be taken when making cables. See **Figure 74** for RJ12 pin callout.

Figure 74 CAN cable pin location and connection code



Wire Color Code

Pair Number	Pair Color	
1	Black	Brown
2	Blue	Violet
3	Yellow	Green

Figure 75 Connect CANbus cable

4.3.6 Replace CANbus Cable Between Liebert iCOM Display and Liebert iCOM Main Board with Grounded CANbus Cable

The incoming CANbus cable from the first 2T sensor in the daisy chain is landed on the rear of the Liebert iCOM display. The factory installed CANbus cable from the rear of the display to the main board in the electrical panel does not included a ground feature and must be replaced with a 6' grounded CANbus cable (Part #300157G1). This installation will require four tie wraps to replace those cut during the removal of the factory-installed CANbus cable from the display to the main board. Ensure there is enough slack in the wire to allow the door to open and close freely, but not too much slack to bind or pinch when the door is shut.

4.3.7 Install Grounding Ring Connector in Electrical Panel

WARNING

Risk of electrical shock. Can cause injury and death.

Disconnect local and remote power supplies before working within.

Before proceeding with installation, read all instructions, verify that all the parts are included and check the name® microprocessor does not isolate power from the unit, even in the Unit Off mode.

Some internal components require and receive power even during the Unit Off mode of the Liebert iCOM control.

The factory-supplied optional disconnect switch is inside the unit. The line side of this switch contains live high voltage.

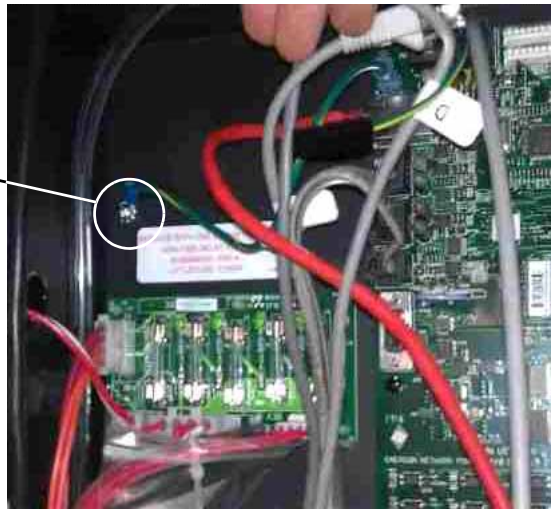
The only way to ensure that there is NO voltage inside the unit is to install and open a remote disconnect switch. Refer to the unit electrical schematic.

Follow all local codes.

After installation, the grounding ring (Part #300245G1) must be used to provide the final connection between the CANbus cable and the metal frame of the unit. The grounding ring can use the same screw location that the board grounding ring uses as shown in picture below. The panel comes terminated from the factory and must be unterminated to allow adding sensors.

Connecting the CAN bus sensors will require working in the high voltage electrical compartment of the cooling unit.

Figure 76 Install grounding ring connector



4.3.8 Software Setup

Cooling units to be set up for Teamwork Mode 3 (Liebert Optimized Aisle Control) must be connected in a Liebert iCOM U2U network and must have:

- Digital scroll compressors, chilled water valves or four-step compressors. (Two-step semi-hermetic compressors and standard scroll units cannot be configured for Teamwork 3.)
- Variable speed fans
- Supply air sensors connected for temperature control.

1. Go to the Service Menu > Remote Sensors and verify that all the connected 2T sensor readings are shown.
2. Set the corresponding sensors' nodes to either control or reference. These settings are based on rack setup or customer preference.
3. Determine the appropriate setting for SB03 Unit Remote Sensor Mode/AVG incl. The values set here will determine how the Liebert iCOM monitors inlet rack temperature to control the fans.

   Max: controls fan(s) based on the maximum rack temperature.

   Average: controls fan(s) based on an average rack temperature. The number of sensors to be used to calculate the average is determined to the far right. If the number of sensors to be used to calculate the average is less than the number of rack sensors programmed for control, the Liebert iCOM will average only the highest sensor readings.
4. Set Service Menus > Setpoints S103 Temperature Control Sensor to *Supply*. This parameter must be set at each unit.
5. Go to Service Menu > System/Network Setup S803 Teamwork Mode. Change the value to the right to *3 Optimized Aisle.*
6. Go to Service Menu > Setpoints S146 Fan Control Sensor and set this to Remote. This parameter only needs to be set for one unit. The other connected units in the group will auto-set themselves.
7. Adjust the rack temperature Setpoint at S147 to the desired value. This is typically set to 75, but is customer preference.
8. Adjust S103 Temperature Setpoint to the desired value. This will must be set on a unit-to-unit basis depending on the unit's area of influence.
9. Monitor operation and adjust corresponding setpoints and control bands as needed.

4.3.9 Standby—Rotation

Typical Standby (Lead/Lag) Function

This function can be performed in any teamwork mode, including NO Teamwork.

One or more units can be defined to be Standby; the normal status of standby units is Standby Off (fan Off).

In case one regular unit has an alarm that is defined (to be defined in the alarm configuration), to switch On a standby unit, the faulty unit will switch Off and the standby unit will switch On.

If the next unit has an alarm, the next standby unit will be started. If no more standby units are available, the unit with a non-critical alarm that permits unit operation will be switched On again (water detection, fan alarm, fire alarm etc. will not permit unit restarting).

The standby function can be rotated daily (setting the time), weekly (setting the day of the week and time) or monthly (setting the first weekday of the month and time).

The rotation is performed with a selectable number of units: if 1 is selected, to standby rotates from 1-2 to 2-3 in a 4 units configuration with two standby units, and rotates from 1-2 to 3-4 in the same configuration, when the rotation parameter is set to 2.

NOTE

Before entering standby mode, units may operate the fan only for 3 minutes if previously calling for heat or humidification to cool components and remove steam from the unit.

Standby and Cascade

Cascade is possible in Teamwork Mode 1 and 3 only.

Line S508 Cascade Units has the options of Yes, Cool / Heat, Cooling, Fan

Yes—Based on a call for heating, cooling, humidification or dehumidification. TW1

Cool / Heat—Based on a call for heating or cooling. Teamwork Mode 1

Cooling—Based on a call for cooling. Teamwork Mode 1

Fan—The only selection available for Teamwork Mode 3; not available in Teamwork Mode 1. Uses fan control deviation to stage on standby unit fans / cooling. Fans stage serially according to the system fan control band and temperature control is based on the local supply deviation. (Fan proportional band / number of connected units)

The standby unit will remain On for the time set in the parameter. The default is 30 minutes; range is from 2 to 360 minutes.

Standby units will start if an alarm occurs in one of the operational units. If the standby units are cascaded or in Teamwork Mode 3, they will also start and work with the regular operational units if the temperature or humidity cannot be controlled by the operational units; before a high or low temperature / humidity condition occurs. Cascaded units are switched Off again as soon as the temperature / humidity returns back to normal.

The master unit defines its proportional band according to the number of available units (see **4.2.3 - Teamwork Mode 1**).

When a standby unit receives a request for full heating or cooling from the master unit (see **3.2.1 - Temperature Proportional Band**), it will respond to the request after its control delay.

NOTE

Cascaded units are not included in the calculation of the average temperature / humidity.

5.0 INSTALLING A LIEBERT iCOM UNIT-TO-UNIT NETWORK

Connecting multiple Liebert iCOM-controlled cooling units in an Ethernet Unit-to-Unit (U2U) network enables the units to work together to achieve efficient cooling and humidity control of the conditioned space. Networking enables setting up the cooling units to exchange data for various modes of operation:

- Teamwork
- Lead/Lag-Standby
- Rotation
- Cascade

However the cooling units are set up, a large display may be used to control and view the operational status of individual units or of the entire system.

NOTE

The maximum number of cooling units that may be interconnected is 32.

5.1 Placement of Cooling Units

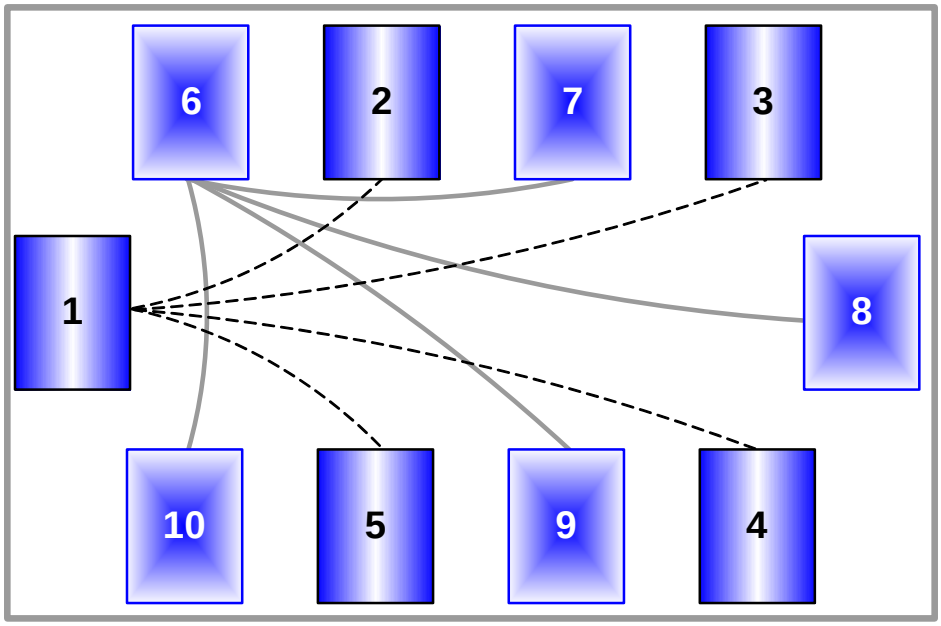
Refer to the cooling unit product manuals for details on installation. Also consider these factors when planning for installation of cooling units with Liebert iCOM controls:

- heat load in the conditioned space
- cooling air distribution
- number of operating units versus number of standby cooling units
- location of the network switch—An Ethernet cable cannot exceed 328 feet (100m)

5.1.1 Balancing Operating and Standby Units

Assign identification to the units in a manner that balances the operating units and standby units according to room layout and heat-load requirements. For example, identify the operating units with numbers 1 through 5 and the standby units 6 through 10. Refer to **Figure 77**.

Figure 77 Standby unit layout example—10 cooling units in room



5.2 U2U Hardware: Cables and Network Switch

Plan wiring runs for U2U communication when designing the layout of your conditioned space. In addition to general good wiring practices, take into account:

- Ethernet CAT5 or greater cable is required for interconnecting the units.
- Maximum distance must not exceed 328 feet (100m).
- A device to boost the Ethernet signal may be used to exceed the 328 feet (100m) length limitation.
- Ethernet network should be private—set up only for management and control of the cooling units.
- Keep control and communication cables away from power cables to prevent electromagnetic interference.
- Do not bend cables to less than four times the diameter of the cable.
- Do not deform cables when securing in bundles or when hanging them.
- Keep cables away from devices that can introduce noise into them, such as machines, fluorescent lights, and electronics.
- Avoid stretching Ethernet cables—tension when pulling cables should not exceed 25 pounds (11kg).
- Do not secure Ethernet cables with any method that might damage them; use approved hangers, such as telephone wire/RG-6 coaxial wire hangers, available at most hardware stores.

Minimum Network Switch Requirements

- IEEE 802.3; IEEE 802.3u
- 10/100 Mbps speed
- Multiple 10/100 RJ-45 ports—one shared; RJ-45 Uplink port

The Liebert vNSA™ is an approved powered network switch designed to support Liebert iCOM U2U networks. See **Liebert vNSA™ on page 99** for details.

5.3 Wiring for Unit-to-Unit Communications—U2U

Cooling units come from the factory-wired for stand-alone operation.

Liebert iCOM U2U Ethernet Network

The Liebert iCOM U2U network must be isolated from other network traffic. The network switch(es) that connect Liebert iCOMs need to be dedicated to supporting only Liebert iCOM communication. The U2U network cannot be connected to the building or IT network. If network communication is ever lost (failed network switch, etc.), all Liebert iCOM-controlled cooling units will continue to operate as independent units.

The Liebert iCOM can support up to 64 nodes on one network. An input/output board, large display, and large wall-mount display are each considered one node. Of the 64 nodes that may be connected, no more than 32 may be input/output boards (32 cooling units). A small display is not considered a node. Small displays connect directly to input/output boards that do not have large displays attached to them. The following table illustrates how a network can be configured.

Table 17 Sample Liebert iCOM network configurations

Sample Configuration	Input/Output Boards	Large Displays	Small Displays	Wall Mount Large Displays	Private Switch Required
1	2	0	2	0	No
2	2	0	2	1	Yes
3	3	0	3	0	Yes
4	2	1	1	0	Yes
5	8	4	4	1	Yes
6	32	32	0	0	Yes
7	32	27	5	5	Yes
8	32	0	32	32	Yes

Network communication can be configured during system startup by a Liebert-trained technician. For technical issues contact:

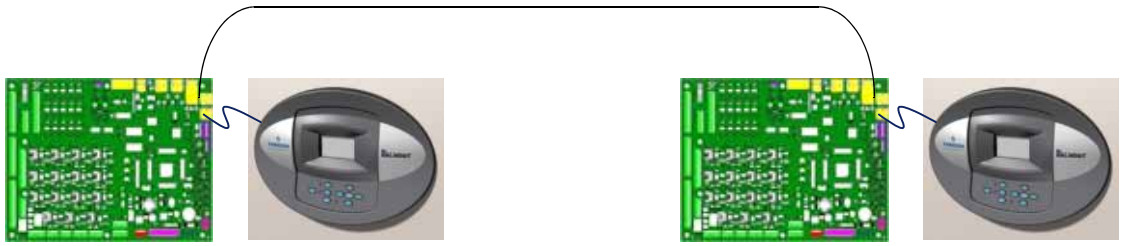
Emerson Technical Service
1050 Dearborn Drive
Columbus, Ohio 43235
Telephone: 1-800-LIEBSRV (800-543-2778)
E-Mail: **technicalservice@emersonnetworkpower.com**

5.3.1 Wiring a Liebert iCOM U2U Network

Small Displays

Two cooling units, each with a small display: To network two cooling units, each with a small display, connect a crossover CAT5 cable between the P64 connectors on each cooling unit's Liebert iCOM input/output board. A network switch is not needed (see **Figure 78**).

Figure 78 Connecting two cooling units, each with a small display, using a crossover Ethernet cable



Three or more units with small displays: To network three or more cooling units, each equipped with a small display. **Figure 81** shows that one plug of the CAT5 cable is connected to P64A connector and the other to the network switch. The P64A, which is connected to port P64 on the control board, is located near it on each cooling unit's Liebert iCOM input/output board to a common network switch. The P64A connector is a crossover coupler that on DS, CW and Challenger units.

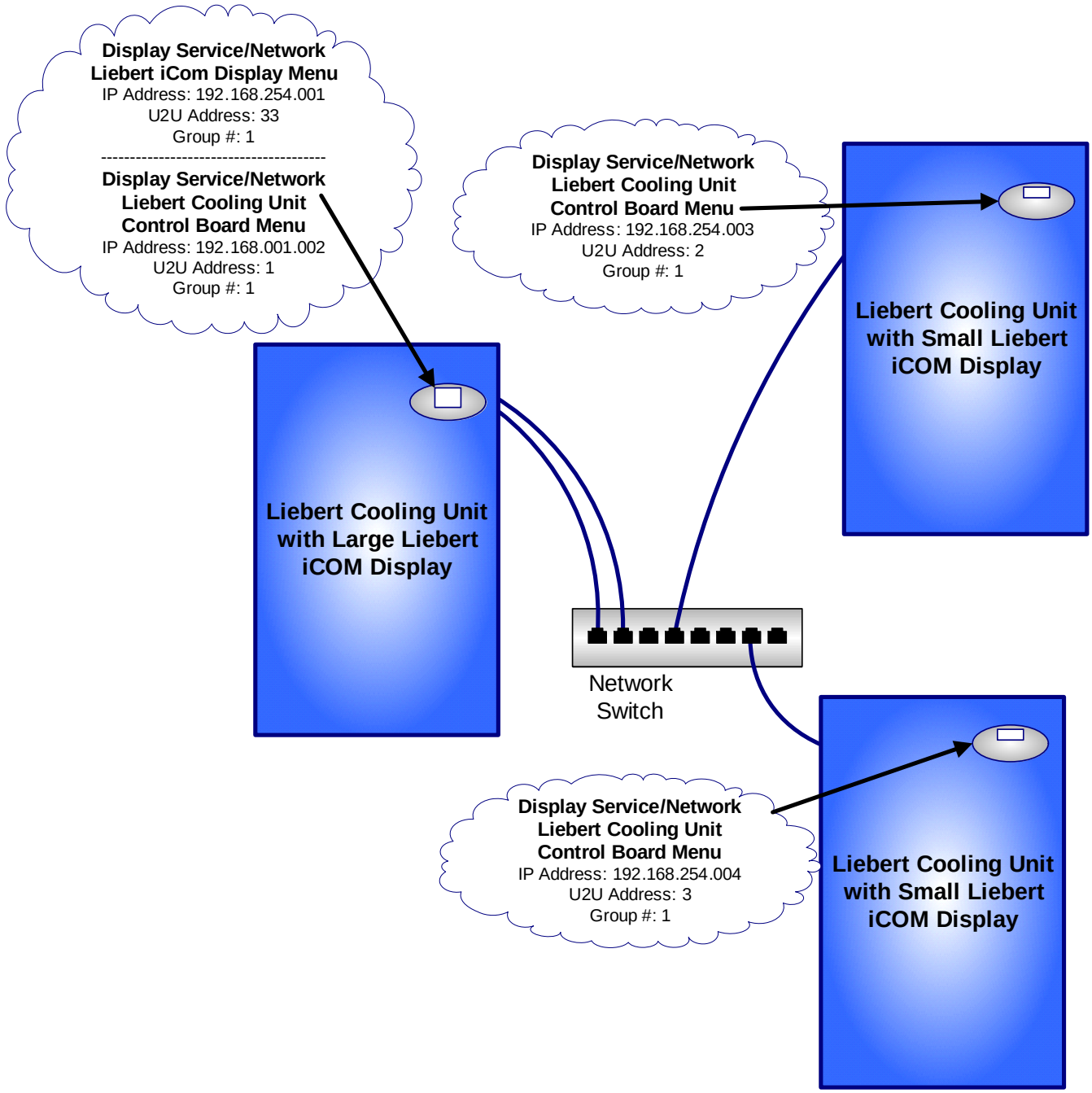
NOTE
If P64A is not available on a unit, connect directly to the Liebert iCOM board on P64.

Large Displays

A network switch is required to enable Ethernet communication on one or more cooling units with large displays. Each cooling unit with a large display requires two straight-through Ethernet cables from a network switch. One cable connects to port P64 on the Liebert iCOM input/output board and the other straight-through cable connects to the female-female coupler, if the female-to-female coupler is provided with the unit. Connect the red crossover cable, which is provided with the cooling unit, between the coupler and the P64 port on the back of the large display (see **Figure 82**). If the female-to-female coupler is not provided, connect the straight-through cable to Port P64 on the large display.

NOTE
A female-to-female coupler is factory-supplied on some cooling units equipped with a large display.

Figure 79 U2U network setup diagram



NOTE

The first three octets of the units' IP addresses must match for proper communication. In the illustration above, these are the matching octets: 192.168.254

Wall-Mount Large Display

Only large displays can be used for remotely monitoring and controlling cooling units connected on the same network. Each wall-mount large display requires 120VAC or 230VAC input power; Emerson® provides an AC adapter wall plug. A straight-through Ethernet cable must be connected between the network switch and the P64 port on the back of the display. This will enable control and monitoring capabilities to any cooling unit connected to the network.

Combining Large and Small Displays on a U2U Network

Setting up a network of cooling units equipped with large and small displays requires a network switch. The controls are to be connected to the switch as described above.

Figure 80 Wiring a small display for stand-alone operation

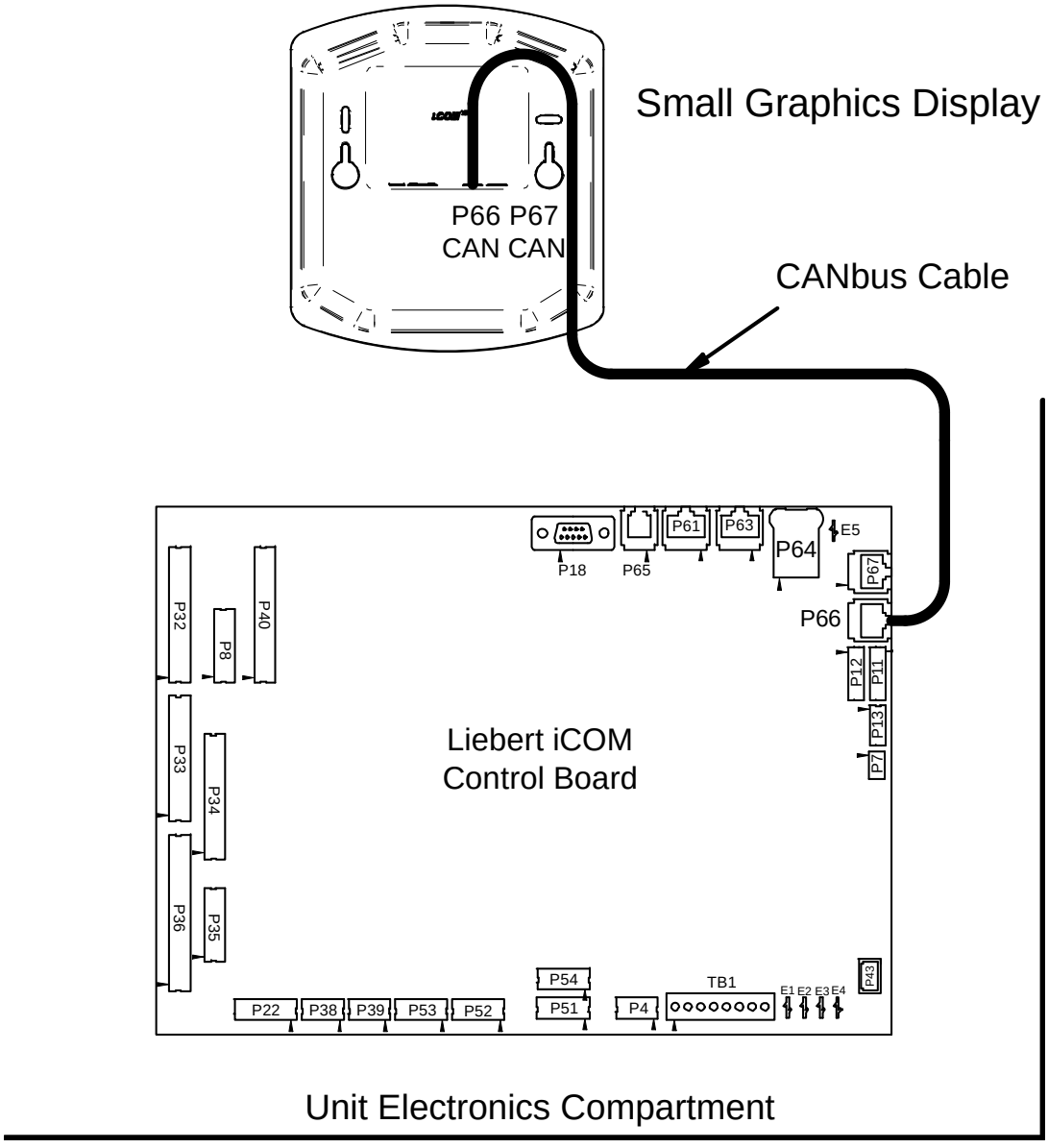


Figure 81 Wiring a small display for U2U network operation

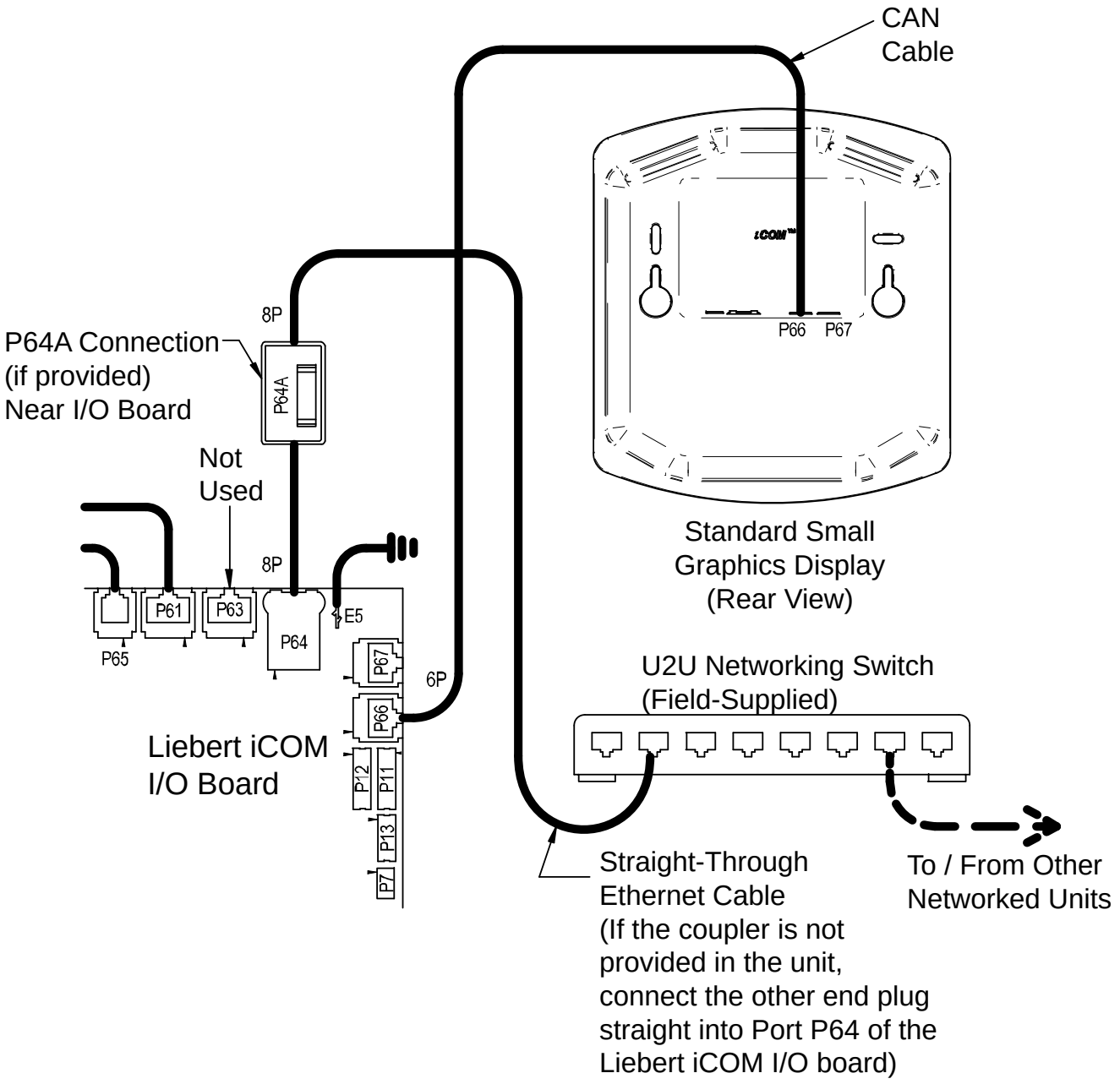
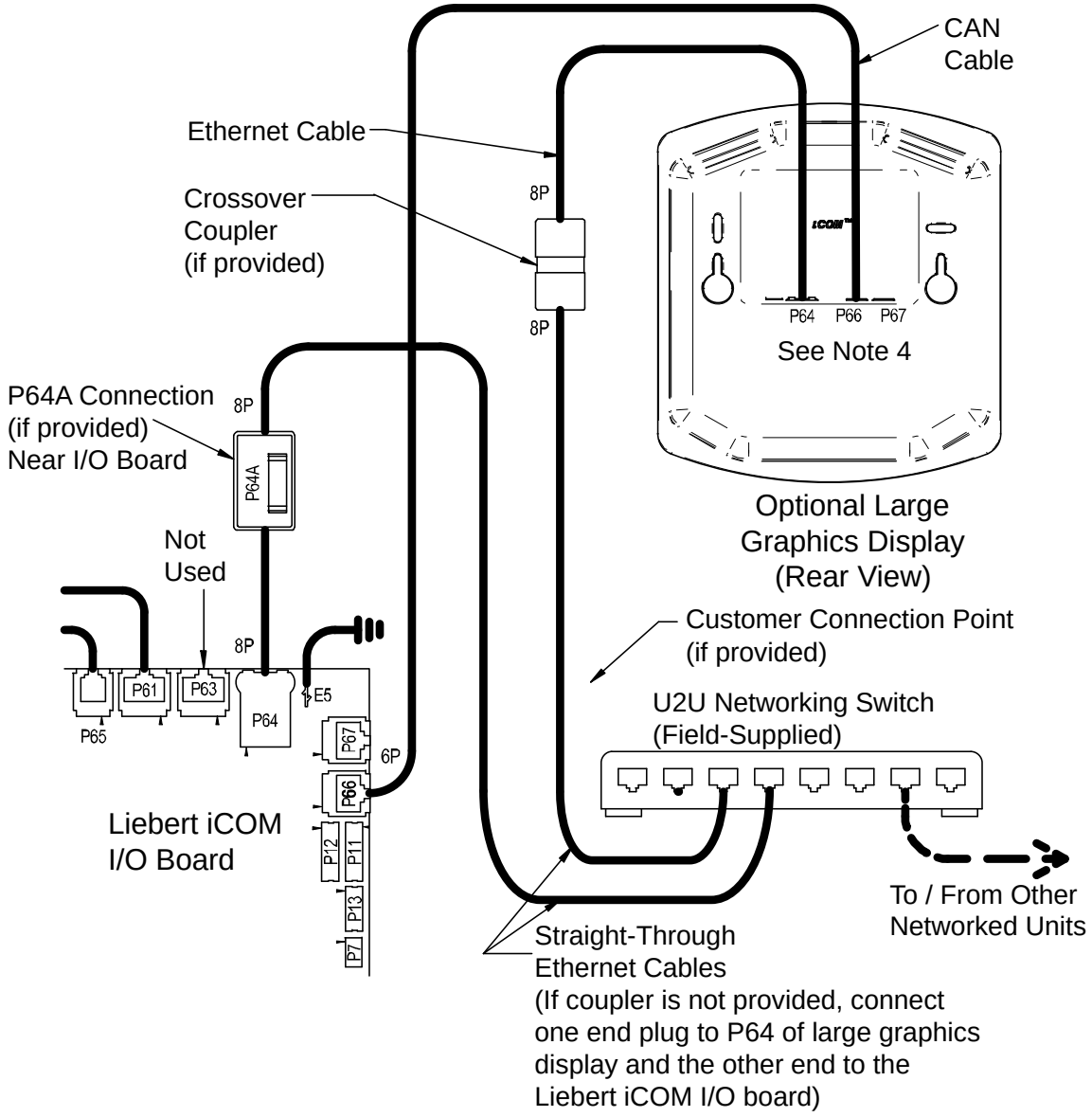


Figure 82 Wiring a large display for U2U network operation



Liebert vNSA™

The Liebert vNSA is designed to connect multiple Liebert iCOMs. The Liebert vNSA contains either one or two powered industrial rail switches. An optional remote large display can be attached to the front door as well. All models have a power supply that requires connection to a single phase 120VAC or 230VAC power source. The enclosure features a key lock for security.

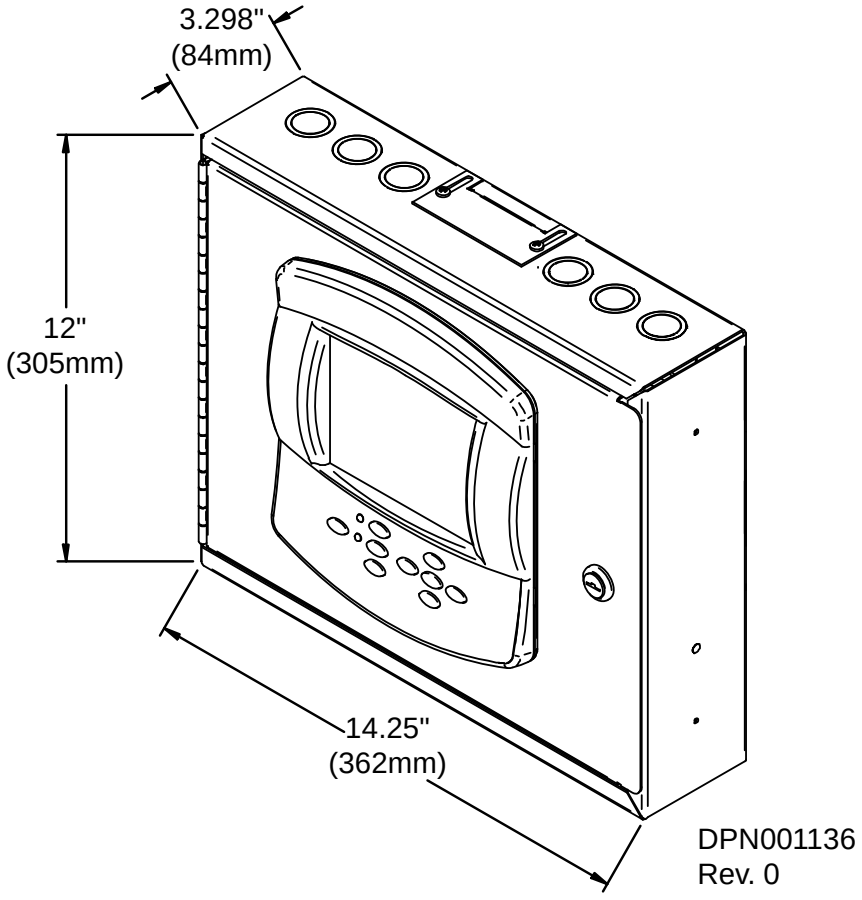
The Liebert vNSA supports autonegotiation, autopolarity and autocrossing, allowing for the use of standard network cables for connection to each port, rather than special crossover cables. The switch detects and makes adjustments for the network's speed and transmission mode, polarity and transmit-and-receive pins. See the Liebert vNSA user manual, SL-18840, for more details.

The number of ports available for connecting Liebert iCOMs varies by model as shown in **Table 18**. Models with a remote large display attached to the front door utilize one of the available Ethernet ports in the Liebert vNSA. Models with two switches utilize two ports to connect the switches.

Table 18 Ports available for connecting Liebert iCOMs

Model	Liebert vNSA With Remote Large Display	Total Number of Ports	Number of Ports Used to Connect Remote Large Display	Number of Ports Used to Interconnect Switches	Number of Ports Available to Connect Liebert iCOM Control Devices
Liebert vNSA8-Liebert iCOM	Yes	8	1	-	7
Liebert vNSA16-Liebert iCOM		16	1	2	13
Liebert vNSA8	No	8	-	-	8
Liebert vNSA16		16	-	2	14

Figure 83 Liebert vNSA with optional remote large display



6.0 EXTERNAL COMMUNICATION—BUILDING MANAGEMENT SYSTEMS, LIEBERT SITESCAN®

Liebert iCOM is capable of communicating with external monitoring systems, such as Building Management Systems (BMS), Network Monitoring Systems (NMS), Liebert's SiteScan® Web and others.

Each Liebert iCOM-controlled cooling unit is equipped with Liebert IntelliSlot® plug-in slots for use with optional communication cards. The hot-swappable plug-in cards provide interfaces supporting open protocols, including:

- Emerson Protocol for Trellis™, Liebert SiteScan™ and Liebert Nform®
- Embedded LIFE™ Technology for Remote Service Delivery
- SNMP (v1/v2c/v3) for Network Management Systems
- HTTP/HTTPS for Web page viewing
- SMTP for e-mail
- SMS for mobile messaging
- Modbus RTU-Modbus Remote Terminal Unit (RTU) communication protocol for Building Management Systems over a RS-485 serial network (also called Modbus RTU RS-485)
- Modbus TCP-Modbus Transmission Control Protocol for Building Management Systems over an Internet or LAN
- BACnet IP—BACnet over Internet Protocol for Building Management Systems over the Internet or a LAN
- BACnet MSTP—BACnet Master-Slave/Token-Passing (MSTP) communication protocol for Building Management Systems over an RS-485 serial network (also called BACnet MSTP RS-485)

Velocity V4 monitoring protocol is required to ensure monitoring connectivity with all the protocols mentioned above. Velocity V4 protocol is standard in Liebert iCOM software version PA1.04.033 and later.

Liebert iCOM software versions PA1.04.022.STD and older, which shipped before November 2010, will support Velocity V3. Older Velocity V3 cards will become obsolete with the advent of the Velocity V4 protocol and the newer Liebert IntelliSlot cards that communicate with this protocol. See **Table 19** for information about software versions, card compatibility and supported protocols from each card.

Another communication option is the Liebert IntelliSlot SiteLink-E® CARD (IS-485EXI), which provides ground fault isolated connection to a Liebert SiteLink-E for monitoring and management. See the Liebert Web site for the latest supported protocols, monitoring reference information and SNMP MIBs: **www.liebert.com**

Table 19 Liebert IntelliSlot card compatibility

Software Version	Card Compatibility	Protocol Supported
PA2.01.029.04R Velocity V4	IS-UNITY-DP	BACnet IP, BACnet MSTP, Emerson Protocol Trellis™, Liebert SiteScan™ and Liebert Nform®, HTTP, HTTPS, Modbus RTU, Modbus TCP, SNMP, SMTP for e-mail,
PA1.04.033.STD—Velocity V4	IS-485L	Modbus RTU 485
	IS-WEBL	SMTP, SNMP, SMS, HTTP
	IS-485EXI	Liebert SiteLink-E™ communication card (supports enhanced data set for Liebert iCOM)
	IS-IPBML	Modbus IP
	—	* BACnet available soon
PA1.04.022.STD and Older—Velocity V3	OC485-LBDS	Modbus RTU 485 / IGMNet Extended
	ISWEB-LBDS	SNMP, HTTP

The newer communication cards support the latest information available through Liebert iCOM. Previous Liebert IntelliSlot cards should be used for legacy information.

6.1 Terminals 77 and 78

Emerson® has begun removing the IGMnet Terminals 77 and 78 from the Liebert DS,™ Liebert CW™ and Liebert Challenger 3000™ product lines. These terminals have been offered in newer products to maintain connectivity with Liebert SiteLink units. This connection has been replaced by using a Liebert IntelliSlot® card that will provide this connection in addition to providing isolation between the Liebert iCOM control and the external wiring to the Liebert SiteLink that did not exist with the 77/78 connection.

To retain the communication capability to the Liebert SiteLink and Liebert SiteLink-E™, a Liebert IntelliSlot SiteScan Protocol Extender Card (model number: IS-485EXI) is available. This card is available as a ship-loose item on the Liebert IntelliSlot Cards PartnerWeb order form. It will be added to cooling unit order forms in the future.

If the Liebert IS-485EXI extender card is used with IGMnet from the Liebert iCOM, no other Liebert IntelliSlot cards can be used, however, if a Liebert SiteLink-E will be communicating with Liebert iCOM via the new Velocity V4 protocol, then an additional Liebert IntelliSlot card can be used in conjunction with the Liebert SiteLink-E:

- Liebert IntelliSlot 485 Card: IS-485L
- Liebert IntelliSlot Web Card: IS-WEBL
- Liebert IntelliSlot Web / Modbus IP / BACnet IP / BACnet IP Card: IS-IPBML

If all units in a installation must be identical and the user does not want to utilize the Liebert IS-485EXI isolation card the 77/78 connection can be obtained from Liebert.

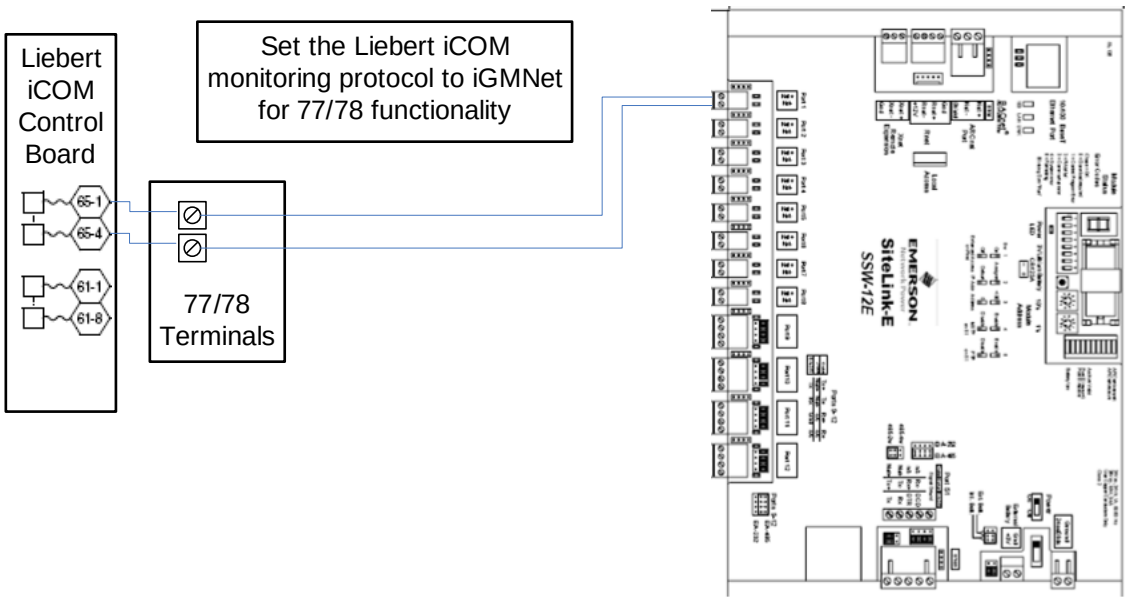
Table 20 Kit parts numbers

Part #	Kit Part Name
SKEICMIGMTRM122	KIT ICOM IGM TERM 77/78 122"
SKEICMIGMTRM144	KIT ICOM IGM TERM 77/78 144"
SKEICMIGMTRM160	KIT ICOM IGM TERM 77/78 160"
SKEICMIGMTRM184	KIT ICOM IGM TERM 77/78 184"
SKEICMIGMTRM210	KIT ICOM IGM TERM 77/78 210"
SKEICMIGMTRM30	KIT ICOM IGM TERM 77/78 30"
SKEICMIGMTRM65	KIT ICOM IGM TERM 77/78 65"
SKEICMIGMTRM96	KIT ICOM IGM TERM 77/78 96"

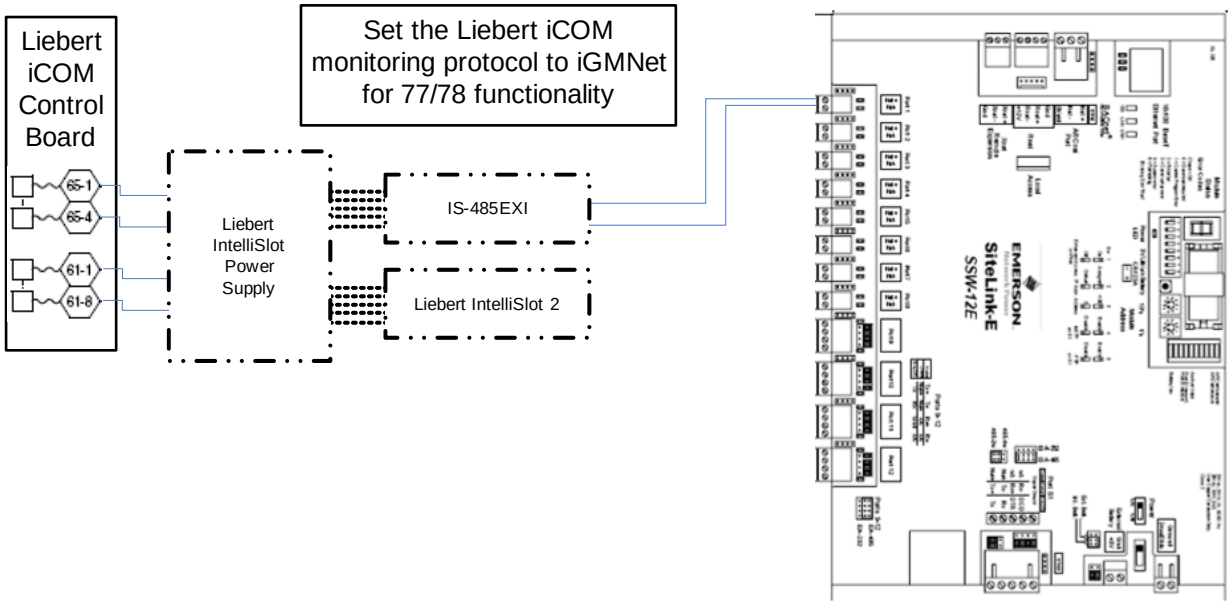
Below is a drawing to help clarify the connections on legacy equipment in relationship to newer equipment without the 77/78 terminal connection.

Figure 84 Connection to Liebert SiteLink™ via 77/78

Previous Connection to SiteLink via 77/78



New Connection to Liebert SiteLink via IS-485EXI



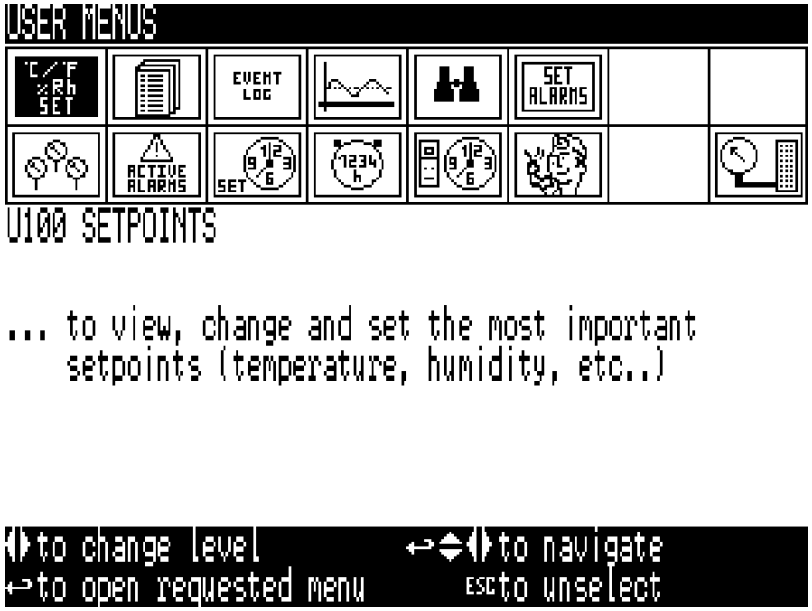
7.0 USER MENU PARAMETERS

User menus report general cooling unit operations and status. The user menu password is **1490**.

The User menu parameter tables in this manual may differ from the display on your cooling unit. The Liebert iCOM functions with several Liebert Precision Cooling units, each with its own set of control commands. In addition, the Liebert iCOM firmware is being updated constantly. As a result, the User menu parameter tables in this manual may differ from the display on your cooling unit. Check **www.liebert.com** for the latest Liebert iCOM user manual updates.

Figure 85 User menu icons

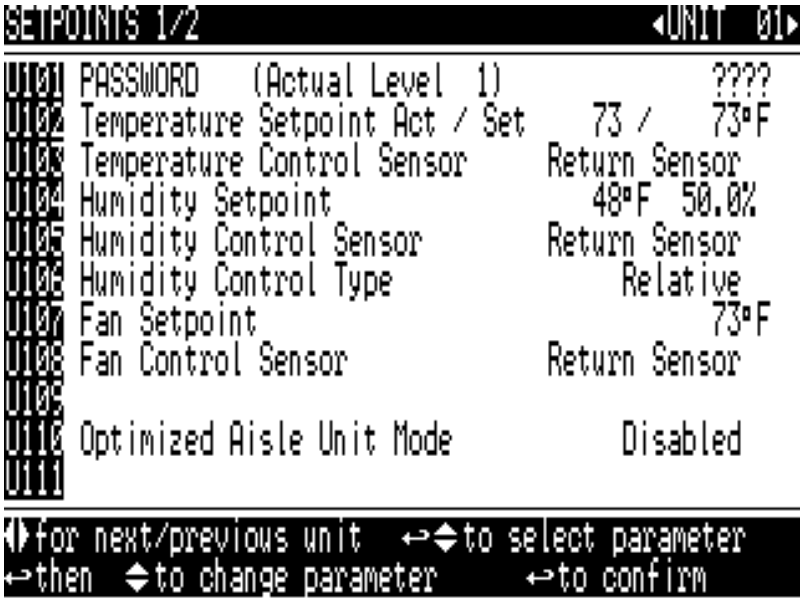
User Menu password: 1490



7.1 User-Setpoints Screens

Setpoints allows the user to view, change and set the most important setpoints (temperature, humidity, etc.) in a central location.

Figure 86 Setpoints screen, page 1



U102 Temperature Setpoint—Selects a temperature that the cooling unit will maintain by applying cooling and or reheats. There are two values in this field. The Temp Set value is the temperature that has been set by the user to control the temperature. The Temp Act value is a read only value that indicates if another routine, like supply compensation has internally modified the Temp controlling value. If compensation has not been activated, then ACT and SET will always match. This parameter is adjustable from 41-104°F (5-40°C). The factory default value for Supply is 64°F. The factory default value for Return & Remote=73°F.

U103 Temperature Control Sensor—Selects the sensor that will control the cooling capacity. Cooling capacity is either the Chilled Water Valve, Compressor, FreeCooling Valve or Air Economizer. Unloading type compressors can be set to any sensor type, however fixed style compressors can only be set to Return or Remote control type l. This parameter can only be changed in the service menu. The range should be Supply, Return or Remote Sensor. The factory default setting is Return.

U104 Humidity Setpoint—Selects a humidity that the cooling unit will maintain by removing or adding moisture to the air. The humidity setpoint will either be set in percent RH or as a Dew Point Value depending on what the humidity control type is set for. This parameter is adjustable from 20-80%. The factory default setting is 50%.

U105 Humidity Control Sensor—Defines which humidity value the humidity setpoint is compared with. The return sensor is equipped with a Temp / Hum sensor and can calculate the dew point based on iCOM's internal lookup table. If a sensor other than the return sensor is selected, then iCOM will calculate the correct RH% based on the sensor selected and its actual temperature. The range is Remote or Return Sensor. The factory default setting is Return Sensor.

U106 Humidity Control Type—Selects the humidity control calculation. Setting this parameter to "Relative" will control the humidity without considering any temperature deviations. "Predictive" and "Absolute" control consider the temperature deviation from temperature setpoint so that a constant level of moisture is kept in the area based on the humidity sensor reading and the temperature deviation from setpoint.

Dew Point allows Liebert iCOM to calculate the actual dew point of the room and to control the humidity based on a user-entered dew point temperature. The range is Relative, Absolute, Predictive and Dew Point. The factory default setting is Predictive.

U107 Fan Setpoint—Needed anytime the fan operates from a different sensor than the temperature setpoint. Example: The temperature setpoint is set to Supply Air and the fan control is set to Remote Sensor.

This is considered "Optimized Aisle" control, which decouples the fan and cooling capacity modulation. In the above example, this value would set the remote sensor setpoint to control the fan speed. This parameter is adjustable from 41-104°F (5-40°C). The factory default setting is 73°F.

U108 Fan Control Sensor—Determines the sensor which will control the speed of the fan. This parameter works in conjunction with the Fan Control Setpoint.

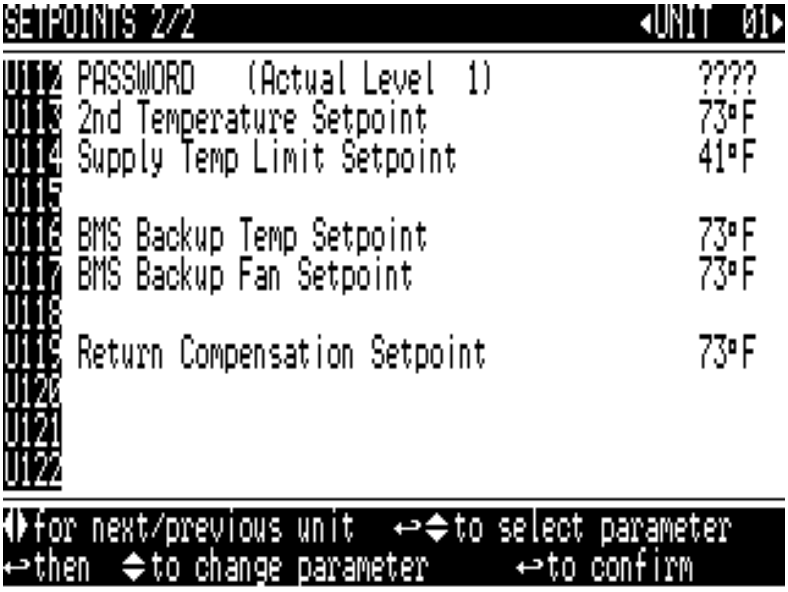
The Liebert iCOM control also has the ability to control the fan speed manually. This means that the fan control can be set through the local Liebert iCOM display or via a building management system through one of the various Liebert IntelliSlot® monitoring cards. The range is Supply, Return, Remote or Manual. The factory default setting is Return Sensor.

U110 Optimized Aisle Enabled—This read-only value indicates if the Liebert iCOM controller is setup in a Optimized Aisle configuration.

To enable optimized aisle within Liebert iCOM, the Supply Air sensor must be set to control the cooling capacity and the remote sensor must be set to control the fan speed. This allows the cooling unit to maintain inlet rack temperatures while still maintaining an even under-floor air temperature when controlling unbalanced rooms.

Optimized Aisle will automatically adjust based on the application (None, End or Full Containment).

Figure 87 Setpoints screen, page 2



U113 2nd Temperature Setpoint—Allows for a dry contact through the customer inputs connections. When a customer input connection is set to 2nd Temperature Setpoint and the input is wired to that input is triggered, then the value set in this parameter sets the active temperature setpoint. This parameter is adjustable from 41°F to 81°F. The factory default setting is 41°F.

If the unit is operating in De-Coupled mode, then this setpoint will only affect the temperature control setpoint; it will not affect the fan control setpoint.

U114 Supply Temp Limit Setpoint—Selects the minimum discharge air temperature. When the actual sensor reading approaches this parameter, the cooling capacity will be limited to avoid going below the Supply Limit Temperature value. This parameter must be enabled in the Service / Setpoints menu prior to setting a supply limit setpoint. This parameter is adjustable from 41°F to 81°F. The factory default setting is 41°F.

U116 BMS Backup Temp Setpoint—Selects a temperature setpoint that will be activated in the event of a BMS time-out or a customer input signal. The BMS timer and/or the customer input must be configured for this parameter to activate. This parameter is adjustable from 41-104°F (5-40°C). The default setting from the factory is 73°F (23°C).

If the unit is operating in De-Coupled mode, then this setpoint will only affect the temperature control setpoint; it will not affect the fan control setpoint.

This parameter is adjustable from 41-104°F (5-40°C). The factory default setting is 73°F (23°C).

U117 BMS Backup Fan Setpoint—Selects a temperature setpoint when backup fans will be activated in the event of a BMS time-out or a customer input signal. The BMS timer and/or the customer input must be configured for this parameter to activate.

If the unit is operating in De-Coupled mode, then this setpoint will only affect the temperature control setpoint; it will not affect the fan control setpoint.

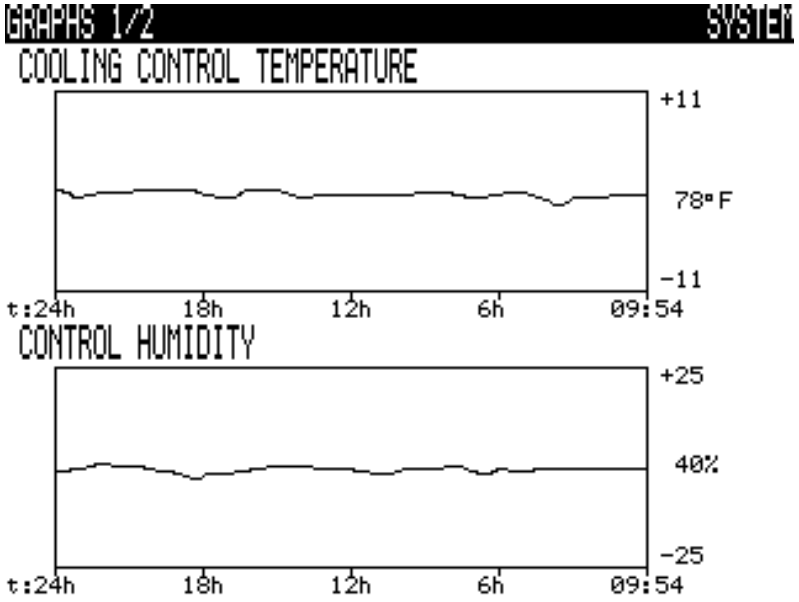
This parameter is adjustable from 41-104°F (5-40°C). The factory default setting is 73°F (23°C).

U119 Return Compensation Setpoint—Allows the return air sensor to be used even when in Supply or Remote temperature control mode. Return Compensation modifies the temperature setpoint to ensure that the return air temperature is kept above a specific temperature. If the return compensation value is set to 80°F and the actual return temp falls to 75°F, then the controlling temperature setpoint will be increased and will reflect in the “Control Temp Act.” This parameter is adjustable from 41-104°F (5-40°C). The factory default setting is 73°F (23°C).

7.2 User-Graphic Menu Screens

Graphic screens allow the user to view temperature and humidity graphs. Nine flexible time scales with ranges up to 16 days are available.

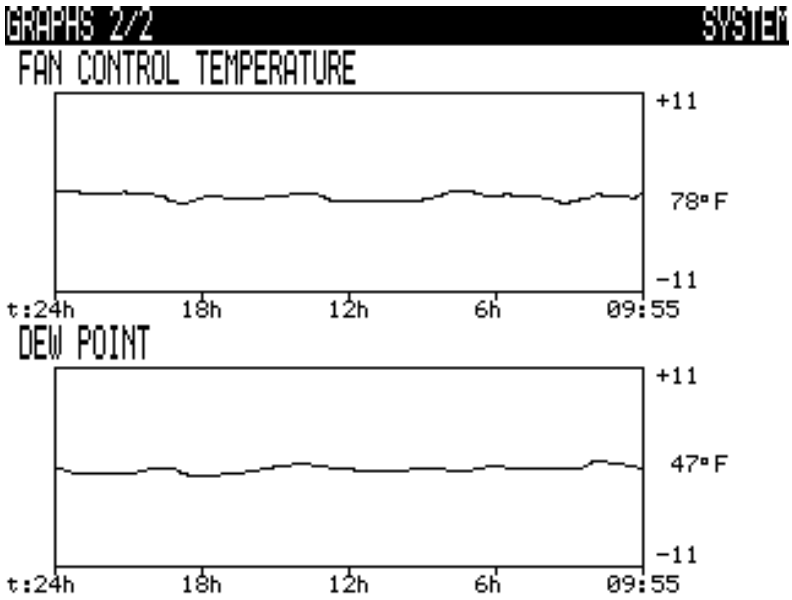
Figure 88 Graphs, page 1



There are two line trend graphs in Liebert iCOM. The upper graph displays temperature data and the lower graph displays humidity data. Each graph can be customized by changing the span of time and the range of the sensor readings.

Each unit has its own temperature and humidity graphs as well as a system graph which displays an average of all connected sensors in the network of units.

Figure 89 Graphs, page 2



Spare Part List

Spare Parts—The spare parts lists contains a detailed description and part number that can be used to order parts for the unit. These part numbers are specific to each model and option installed on the unit.

Event Log

Event Log—The event log displays all events and actions generated by the unit. When multiple units are networked the event log shows results for the whole system. Each event shows the unit that generated the alarm, time and date stamp, a description and the event type.

The event log contains the last 400 events generated by the unit. Events include such occurrences as unit On/Off commands, alarms, warnings and messages. The event log has two views: system view and unit view. When the event log is first entered, the system view is displayed. The system view lists events that have occurred at the unit and other units, if configured in a U2U network. Pressing the Right arrow while viewing the event log for the system view allows the user to see unit-specific events. The unit name and number will appear in the upper right corner for the unit selected. Each event shows the unit that generated the alarm, time and date stamp, a description and the event type. As new events are stored in the log, older events are pushed further down the list.

Once the event log reaches 400 events, the oldest events are erased as new events are stored.

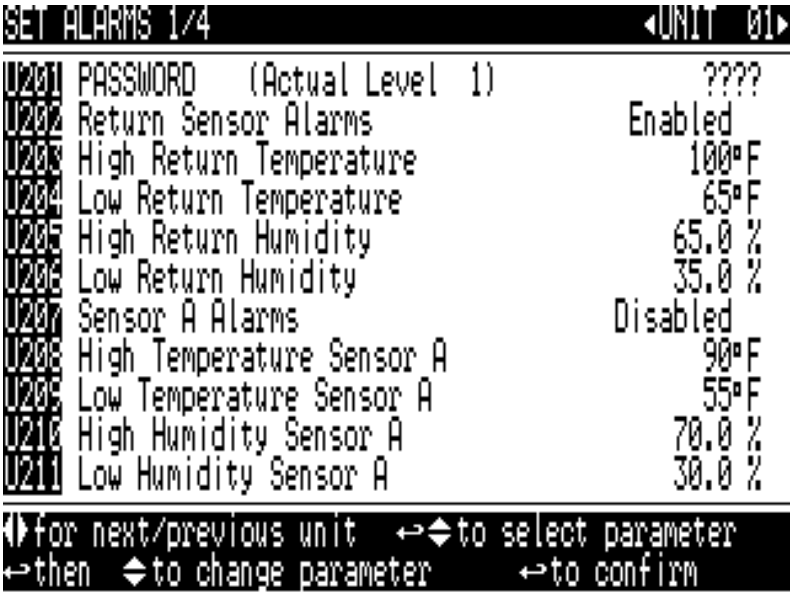
View Network

View Network—The view network screen provides an overview of the Liebert iCOM network and a status of each unit. This screen will provide the unique unit name given to the unit. If no name is given, then only the unit number will be displayed.

7.3 User-Set Alarms Menu Screens

Set Alarms allow the user to view and modify basic temperature and humidity alarms and thresholds

Figure 90 Set alarms screen, page 1


SET ALARMS 1/4
◂UNIT 01▸
U201 PASSWORD (Actual Level 1) ????
U202 Return Sensor Alarms Enabled
U203 High Return Temperature 100°F
U204 Low Return Temperature 65°F
U205 High Return Humidity 65.0 %
U206 Low Return Humidity 35.0 %
U207 Sensor A Alarms Disabled
U208 High Temperature Sensor A 90°F
U209 Low Temperature Sensor A 55°F
U210 High Humidity Sensor A 70.0 %
U211 Low Humidity Sensor A 30.0 %
◂▸for next/previous unit ↩⬍to select parameter
↩then ⬍to change parameter ↩to confirm

U202 Return Sensor Alarms—Enables or disables the return sensor alarms. When enabled, the return temperature and humidity values will be compared to a high and low setting.

U203 High Return Temperature—Allows a user to adjust the point at which the actual return temperature activates a High Temperature Alarm. This parameter is adjustable from 34°F to 210°F. The factory default setting is 80°F.

U204 Low Return Temperature—Allows a user to adjust the point at which the actual return temperature activates a Low Temperature Alarm. This parameter is adjustable from 34°F to 210°F. The factory default setting is 65°F.

U205 High Return Humidity—Allows a user to adjust the point at which the actual return humidity activates a High Humidity Alarm. This parameter is adjustable from 1% to 99%. The factory default setting is 60%F.

U206 Low Return Humidity—Allows a user to adjust the point at which the actual return humidity activates a Low Humidity Alarm. This parameter is adjustable from 1% to 99%. The factory default setting is 40%F.

U207 Sensor A Alarms—Enables or disables the alarms for reference Sensor A. When enabled, the Sensor A temperature and humidity values will be compared to a high and low setting.

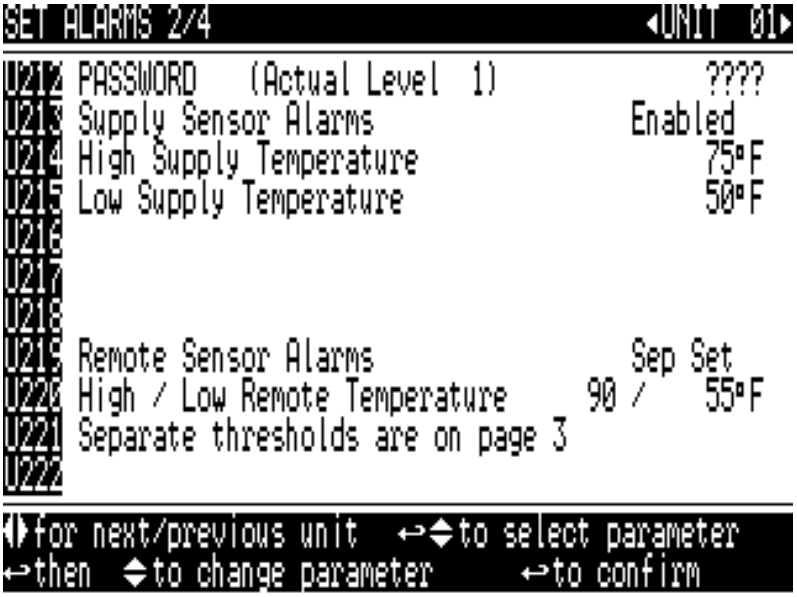
U208 High Temperature Sensor A—Allows a user to adjust the point at which the actual Sensor A temperature activates a High Temperature Alarm. This parameter is adjustable from 34°F to 210°F. The factory default setting is 80°F.

U209 Low Temperature Sensor A—Allows a user to adjust the point at which the actual Sensor A temperature activates a Low Temperature Alarm. This parameter is adjustable from 34°F to 210°F. The factory default setting is 65°F.

U210 High Humidity Sensor A—Allows a user to adjust the point at which the actual Sensor A humidity activates a High Humidity Alarm. This parameter is adjustable from 1% to 99%. The factory default setting is 60%F.

U211 Low Humidity Sensor A—Allows a user to adjust the point at which the actual Sensor A humidity activates a Low Humidity Alarm. This parameter is adjustable from 1% to 99%. The factory default setting is 40%F.

Figure 91 Set alarms screen, page 2


SET ALARMS 2/4
◂UNIT 01▸
U210 PASSWORD (Actual Level 1) ????
U213 Supply Sensor Alarms Enabled
U214 High Supply Temperature 75°F
U215 Low Supply Temperature 50°F
U216
U217
U218
U219 Remote Sensor Alarms Sep Set
U220 High / Low Remote Temperature 90 / 55°F
U221 Separate thresholds are on page 3
U222
◂▸for next/previous unit ↵⬍to select parameter
↵then ⬍to change parameter ↵to confirm

U213 Supply Sensor Alarms—Enables or disables the supply sensor alarms. When enabled, the supply temperature and humidity values will be compared to a high and low setting.

U214 High Supply Temperature—Sets the temperature at which the High Supply Temperature Alarm is activated. This parameter is adjustable from 34°F to 210°F. The factory default setting is 75°F.

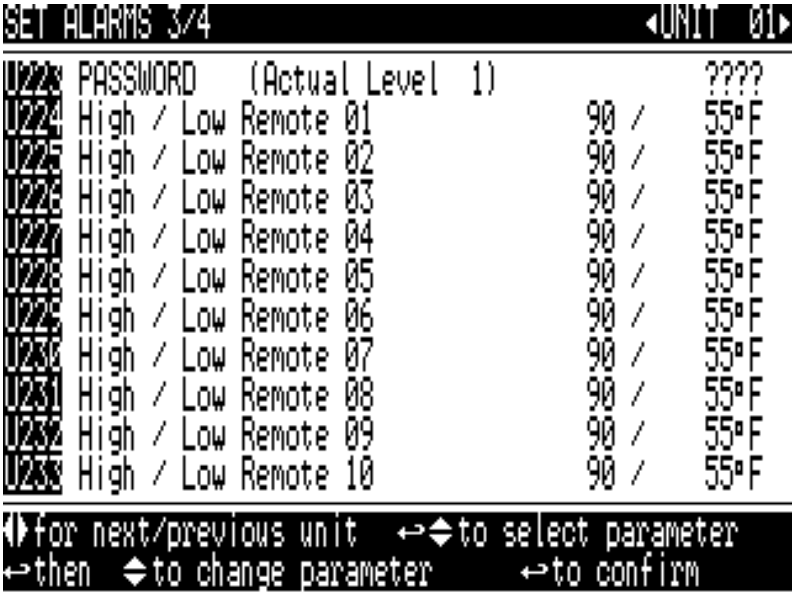
U215 Low Supply Temperature—Sets the temperature at which the Low Supply Temperature Alarm is **U21**activated. This parameter is adjustable from 34°F to 210°F. The factory default setting is 50°F.

U219 Remote Sensor Alarms—Enables or disables the Remote sensor alarms. When enabled, the Remote temperature values will be compared to a high and low setting.

U220 High/Low Remote Temperature—Enables or disables remote air alarm. When enabled, the high and low temperature alarm will allow a user to adjust the point at which the actual remote temperature activates a Low Remote Temperature Alarm. This parameter is used when common alarm points will be shared by all sensors. Otherwise, the remote sensors can be set individually on page 3. This parameter is adjustable from 34°F to 210°F. The factory default setting 50°F.

U221 Separate thresholds are on page 3—Informational

Figure 92 Set alarms screen, page 3


SET ALARMS 3/4 ◂UNIT 01▸
U223 PASSWORD (Actual Level 1) ????
U224 High / Low Remote 01 90 / 55°F
U225 High / Low Remote 02 90 / 55°F
U226 High / Low Remote 03 90 / 55°F
U227 High / Low Remote 04 90 / 55°F
U228 High / Low Remote 05 90 / 55°F
U229 High / Low Remote 06 90 / 55°F
U230 High / Low Remote 07 90 / 55°F
U231 High / Low Remote 08 90 / 55°F
U232 High / Low Remote 09 90 / 55°F
U233 High / Low Remote 10 90 / 55°F
◂▸for next/previous unit ↩◆to select parameter
↩then ◆to change parameter ↩to confirm

U224-U233 High/Low Remote 01 - 10— Sets the High and Low remote temperature sensor alarm points individually for each sensor when the parameter separate thresholds is set to disabled. The range for both parameters is 34°F to 210°F. The default setting for low alarm is 55°F. The default setting for high alarm is 90°F.

Figure 93 Set alarms screen, page 4

SET ALARMS 4/4 ◂UNIT 01▸
U234 PASSWORD (Actual Level 1) ????
U235 Static Pressure Messages Disabled
U236 High Static Pressure 1.283inWC 320Pa
U237 Low Static Pressure 0.000inWC 0Pa
U238 SP Messages During Unit Off No
U239 SP Messages on Fan Adjust No
U240 SP Transducer High Range 1.283inWC 320Pa
U241 SP Transducer Low Range 0.000inWC 0Pa
U242
U243
U244
◂▸for next/previous unit ↩◆to select parameter
↩then ◆to change parameter ↩to confirm

U235 Static Pressure Messages—Enables or disables the static pressure alarms.

U236 High Static Pressure—Sets the pressure at which the High Static Pressure Alarm is activated. This parameter is adjustable from 0.000 - 1.405 inWC. The factory default setting is 1.284 inWC.

U237 Low Static Pressure—Sets the pressure at which the Low Static Pressure Alarm. This parameter is adjustable from 0.000 - 1.395 inWC. The factory default setting is 0.000 inWC.

U238 SP Messages During Unit Off—Enables or disables the static pressure alarms when the unit is OFF.

U239 SP Messages on Fan Adjust—Enables or disables the static pressure alarms when the fan has been adjusted due to special events. These events include an adjustment for heating, humidification, dehumidification, motor overload / EC fan fault or loss of airflow.

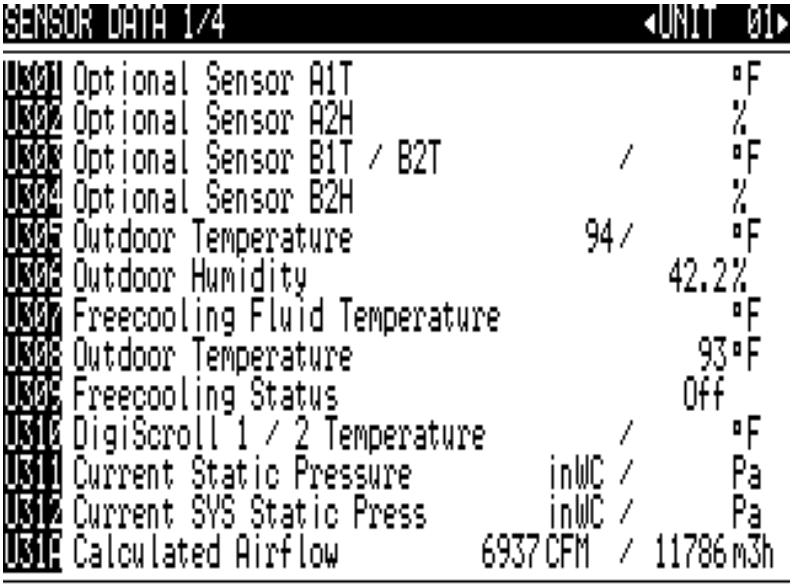
U240 SP Transducer High Range—Sets the pressure range at which the High Static Pressure Out of Range Alarm is activated. This parameter range is adjustable from 0.000 - 1.405 inWC. The factory default setting is 1.284 inWC.

U241 SP Transducer Low Range—Sets the pressure range at which the Low Static Pressure Out of Range Alarm is activated. This parameter range is adjustable from 0.000 - 1.395 inWC. The factory default setting is 0.000 inWC.

7.4 User-Sensor Data Menu Screens

Sensor Data shows the readings and status of standard and optional sensors.

Figure 94 Sensor data screen, page 1


SENSOR DATA 1/4
◂UNIT 01▸
U301 Optional Sensor A1T °F
U302 Optional Sensor A2H %
U303 Optional Sensor B1T / B2T / °F
U304 Optional Sensor B2H %
U305 Outdoor Temperature 94 / °F
U306 Outdoor Humidity 42.2%
U307 Freecooling Fluid Temperature °F
U308 Outdoor Temperature 93°F
U309 Freecooling Status Off
U310 DigiScroll 1 / 2 Temperature / °F
U311 Current Static Pressure inWC / Pa
U312 Current SYS Static Press inWC / Pa
U31A Calculated Airflow 6937 CFM / 11786 m3h

U301 Optional Sensor A1T—Shows the Sensor A temperature value if optional reference sensor is connected to the Liebert iCOM controller area network (CAN) bus. A reference sensor can be connected to any type of Liebert iCOM unit.

This window shows the actual setpoints (read only) for temperature and humidity, as well as the values from all standard and optional sensors.

NOTE
The unit of measure can be selected as °F or °C in the Display Setup menu.

U302 Optional Sensor A2H—Shows the Sensor A humidity value if optional reference sensor is connected to the Liebert iCOM controller area network (CAN) bus. A reference sensor can be connected to any type of Liebert iCOM unit. Sensor A can only be used as a reference sensor for reading and monitoring but not for control purposes. Sensor A is selected by setting the DIP switches on the temperature and humidity board. Refer to **4.3.2 - DIP Switch Settings**.

U303 Optional Sensor B1T/B2T—Shows the Sensor B temperature value if optional reference sensor is connected to the Liebert iCOM controller area network (CAN) bus. A reference sensor can be connected to any type of Liebert iCOM unit. When an optional temperature and humidity or the optional 2T sensor is connected and set as Sensor B, then its value will be displayed on this line. Liebert iCOM will auto detect what type of sensor is connected. Sensor B can only be used as a reference sensor for reading and monitoring but not for control purposes. Sensor B is selected by setting the DIP switches on the temperature and humidity board. Refer to **4.3.2 - DIP Switch Settings**.

U304 Optional Sensor B2H—Shows the Sensor B humidity value if optional reference sensor is connected to the Liebert iCOM controller area network (CAN) bus. A reference sensor can be connected to any type of Liebert iCOM unit. When an optional temperature and humidity or the optional 2T sensor is connected and set as Sensor B, then its value will be displayed on this line. Liebert iCOM will auto detect what type of sensor is connected. Sensor B can only be used as a reference sensor for reading and monitoring but not for control purposes. Sensor B is selected by setting the DIP switches on the temperature and humidity board. Refer to manual for the correct settings.

U305 Optional Sensor C1T—Shows the Sensor C temperature value if optional reference sensor is connected to the Liebert iCOM controller area network (CAN) bus. A reference sensor can be connected to any type of Liebert iCOM unit. When an optional temperature and humidity or the optional 2T sensor is connected and set as Sensor C, then its value will be displayed on this line. Liebert iCOM will auto detect what type of sensor is connected. Sensor C can only be used as a reference sensor for reading and monitoring but not for control purposes. Sensor C is selected by setting the DIP switches on the temperature and humidity board. Refer to manual for the correct settings. This sensor setting is also used as the outdoor sensor in Air Economizer Applications.

U306 Optional Sensor C2H—Shows the Sensor C humidity value if optional reference sensor is connected to the Liebert iCOM controller area network (CAN) bus. A reference sensor can be connected to any type of Liebert iCOM unit. When an optional temperature and humidity or the optional 2T sensor is connected and set as Sensor C, then its value will be displayed on this line. Liebert iCOM will auto detect what type of sensor is connected. Sensor C can only be used as a reference sensor for reading and monitoring not for control purposes. Sensor C is selected by setting the DIP switches on the temperature and humidity board. Refer to manual for the correct settings. This sensor setting is also used as the outdoor sensor in Air Economizer Applications.

U307 Freecooling Fluid Temperature—Displays the temperature of the incoming water on units equipped with a free-cooling coil.

U308 Outdoor Temperature—Reads the outdoor temperature for free-cooling and dual cool units to determine if cooling can be provided without compressor operation. It is determined by comparing the temp between the room and outdoor air temperature. Available only on Liebert HPM™ units.

U309 Freecooling Status—Displays whether free-cooling is available for use, based on the return air temperature and the incoming fluid temperature.

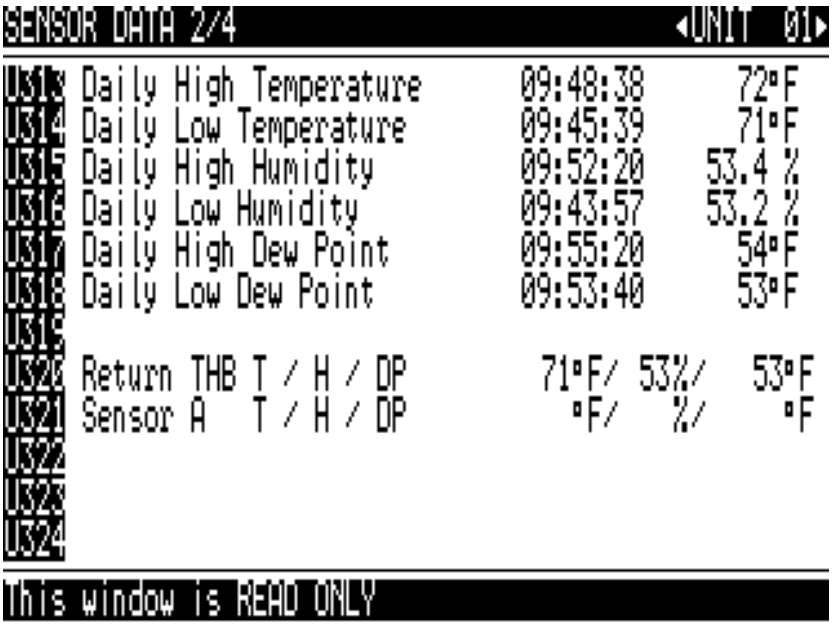
U310 DigiScroll 1/2 Temperature—Shows the actual digital scroll number 1 discharge temperature on units with digital scroll compressors.

U311 Current Static Pressure—Status of the current static pressure of the unit.

U312 Current SYS Static Pressure—Status of the system static pressure where multiple static pressure sensor are shared across the team work network.

U31A Calculated Airflow—Status shows the calculated airflow based on an installed differential pressure transducers.

Figure 95 Sensor data screen, page 2 (return only)


SENSOR DATA 2/4
◂UNIT 01▸
U313 Daily High Temperature 09:48:38 72°F
U314 Daily Low Temperature 09:45:39 71°F
U315 Daily High Humidity 09:52:20 53.4 %
U316 Daily Low Humidity 09:43:57 53.2 %
U317 Daily High Dew Point 09:55:20 54°F
U318 Daily Low Dew Point 09:53:40 53°F
U319
U320 Return THB T / H / DP 71°F/ 53%/ 53°F
U321 Sensor A T / H / DP °F/ %/ °F
U322
U323
U324
This window is READ ONLY

U313 Daily High Temperature—The highest recorded temperature from the temperature controlling sensor between the hours of 12:00 a.m. to 11:59 p.m.

U314 Daily Low Temperature—The lowest recorded temperature from the temperature controlling sensor between the hours of 12:00 a.m. to 11:59 p.m.

U315 Daily High Humidity—The highest recorded humidity from the temperature controlling sensor between the hours of 12:00 a.m. to 11:59 p.m.

U316 Daily Low Humidity—The lowest recorded humidity from the temperature controlling sensor between the hours of 12:00 a.m. to 11:59 p.m.

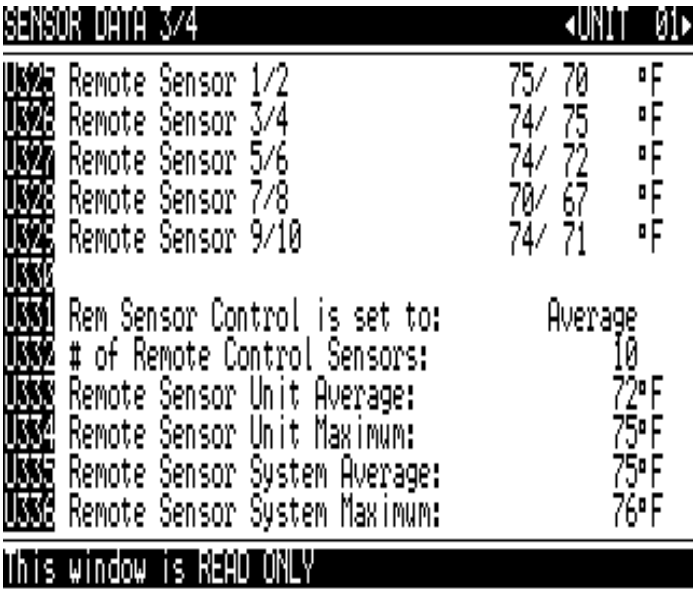
U317 Daily High Dew Point—The highest recorded dew point from the temperature controlling sensor between the hours of 12:00 a.m. to 11:59 p.m.

U318 Daily Low Dew Point—The lowest recorded dew point from the temperature controlling sensor between the hours of 12:00 a.m. to 11:59 p.m.

U320 Return THB T/H/DP—Displays the actual temperature relative humidity and calculated dew point at the return of the unit.

U321 Sensor A T/H/DP—Displays the actual temperature relative humidity and calculated dew point at the sensor A location.

Figure 96 Sensor data screen, page 3


SENSOR DATA 3/4
◂UNIT 01▸
U325 Remote Sensor 1/2 75/ 70 °F
U326 Remote Sensor 3/4 74/ 75 °F
U327 Remote Sensor 5/6 74/ 72 °F
U328 Remote Sensor 7/8 70/ 67 °F
U329 Remote Sensor 9/10 74/ 71 °F
U330
U331 Rem Sensor Control is set to: Average
U332 # of Remote Control Sensors: 10
U333 Remote Sensor Unit Average: 72°F
U334 Remote Sensor Unit Maximum: 75°F
U335 Remote Sensor System Average: 75°F
U336 Remote Sensor System Maximum: 76°F
This window is READ ONLY

U325 Remote Sensor 1/2—Displays the actual remote sensor reading for each remote sensor. The actual value reported here is dependent on how the sensor is setup. If the sensor is set to average, then an average of the 2 temperature readings per sensor will be shown. If the sensor is set to maximum, then the maximum value will be shown.

U326 Remote Sensor 3/4—Same as Remote Sensor 1/2

U327 Remote Sensor 5/6—Same as Remote Sensor 1/2

U328 Remote Sensor 7/8—Same as Remote Sensor 1/2

U329 Remote Sensor 9/10—Same as Remote Sensor 1/2

U331 Rem Sensor Control is set to:—Shows if the sensors are set to be averaged or maximum. This value can be changed in the service menu under remote sensors.

U331 # of Remote Control Sensors—Shows the number of connected remote control sensors.

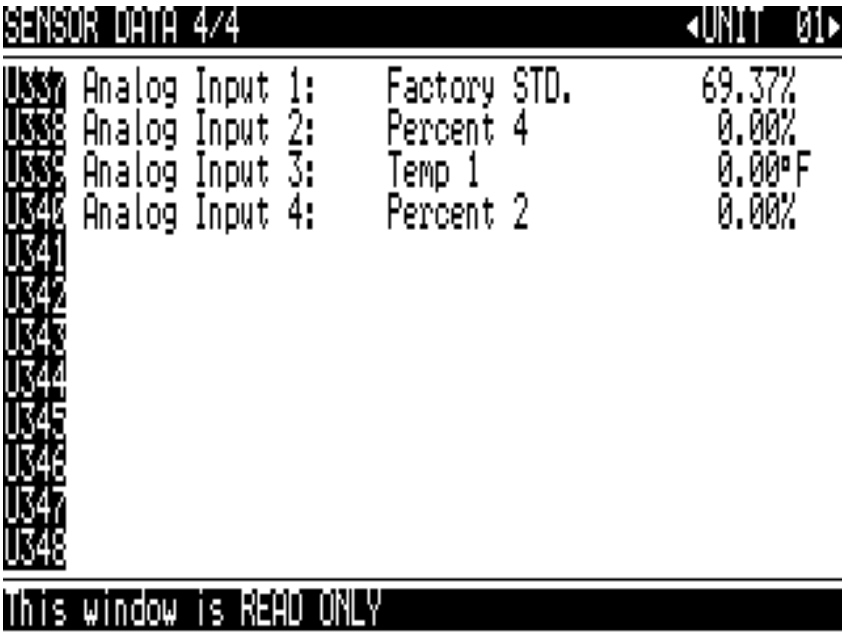
U332 Remote Sensor Unit Average—Shows the remote sensor unit average. This value is displayed regardless of how the unit is setup for control purposes.

U333 Remote Sensor Unit Maximum—Shows the remote sensor unit maximum. This value is displayed regardless of how the unit is setup for control purposes.

U334 Remote Sensor System Average—Shows the “SYSTEM” remote sensor average. This value is displayed regardless of how the unit is setup for control purposes.

U336 Remote Sensor System Maximum—Shows the “SYSTEM” remote sensor maximum. This value is displayed regardless of how the unit is setup for control purposes.

Figure 97 Sensor data screen, page 4



These parameters show the analog input configured device and the value from the device that is connected to the Liebert iCOM control. Refer to the **Figures 8.11** through **162** for a list of analog input devices. The analog input device is setup in the Service menu and could consist of the following devices: Air Pressure, Pressure, Temperature or Percent.

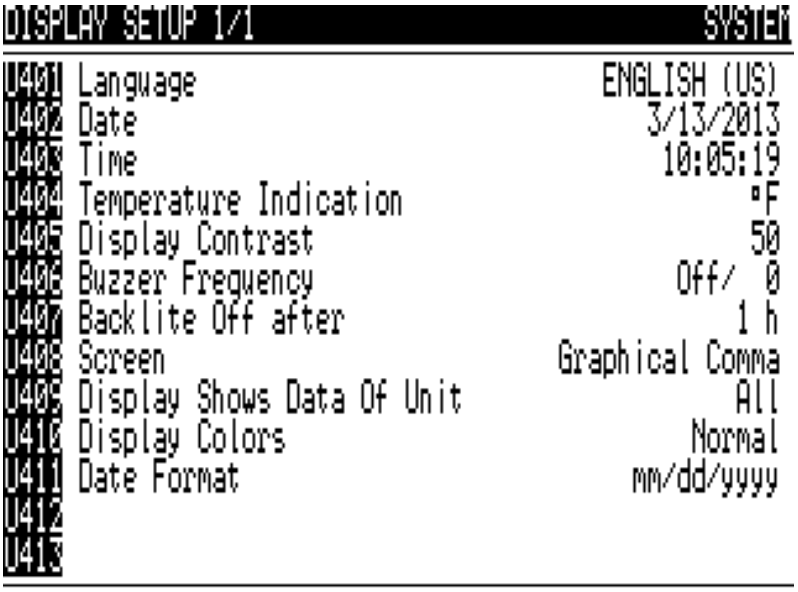
Active Alarms

Active Alarms—Permits viewing all current, active alarms.

7.5 User-Display Setup Menu Screen

Display Setup is where items such as date, time, screen type and temperature indication may be set according to user preference.

Figure 98 Display setup screen



U401 Language—Sets the language on the display. Changing this parameter changes all menu parameters to the selected language.Currently, the supported languages for this version of software is English, Chinese, Japanese and Spanish.

U402 Date—Sets the internal date of the unit. If this unit is connected to other units with the unit to unit network connection, all units will reflect the last date set.

U403 Time—Sets the internal time of the unit. If this unit is connected to other units with the unit to unit network connection, all units will reflect the last time set.

U404 Temperature Indication—Selects the actual and set point temperature indication. Selecting C will set the unit to display in Celsius and F will set the unit to display in Fahrenheit. When the temperature indication is set to display Celsius, proportional bands are displayed as K. This is a calculated value that converts Fahrenheit to Celsius without the -32°F offset.

Example: If the proportional band is 20°F, then (20/1.8) = 11.1K

U405 Display Contrast—Changes the contrast of the display to adjust for different viewing angles, low light and bright light conditions. As the display ages, the contrast may need to be adjusted. The factory default setting is 50.

U406 Buzzer Frequency—Changes the audible noise frequency of the built in buzzer. When adjusting the buzzer frequency, the buzzer will sound allowing selection of a frequency that is easily detected when an alarm occurs. The factory default setting is 50.

U407 Backlite Off After X Hours—Controls the length of time that the back-light remains active when the display is unused. When the buttons on the front display have not been pressed for the time selected in this parameter, the back-light will turn Off, extending the life of the display and saving energy.

U408 Screen—Determines the display mode: Graphical comma, Simple comma, Graphical and Simple

U409 Display Shows Data of Unit—Selects the layout of the main display. Selects if the main display shows the temperature and humidity actual values only, setpoint values only or both actual and setpoint. Selecting graphical and graphical comma will show a bar graph for each component regardless if the component is active. Simple and simple comma only show device icons that are active without a bar graph and hides components that are inactive. Selecting comma in either simple or graphical changes the resolution of the displayed values. The factory default setting is Graphical.

U410 Display Colors—Selects the background color. Inverted sets the display to show white font with blue background; Normal sets a white background with blue font.

U411 Date Format—Changes the month, day, and year arrangement shown on the front display and event time stamps.

Default: MM/DD/YYYY

Other selections: DD.MM.YYYY and YYYY-MM-DD

7.6 User-Total Run Hours Menu Screens

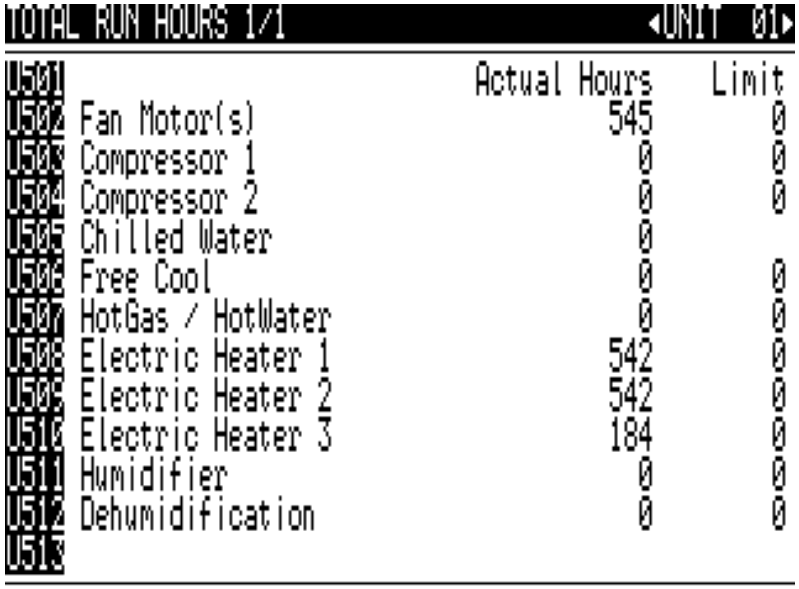
Total Run Hours displays the cumulative hours a particular component has been operating and the limit placed on the hours the component may operate.

Each main component of the unit has its own run hours counter and a threshold. The actual run hours can be reset to 0 by selecting the counter by pressing Enter, and then pressing the Down arrow key. The thresholds can be set the same way.

NOTE

The password needs to be entered in any other screen because this screen does not contain a password entry line.

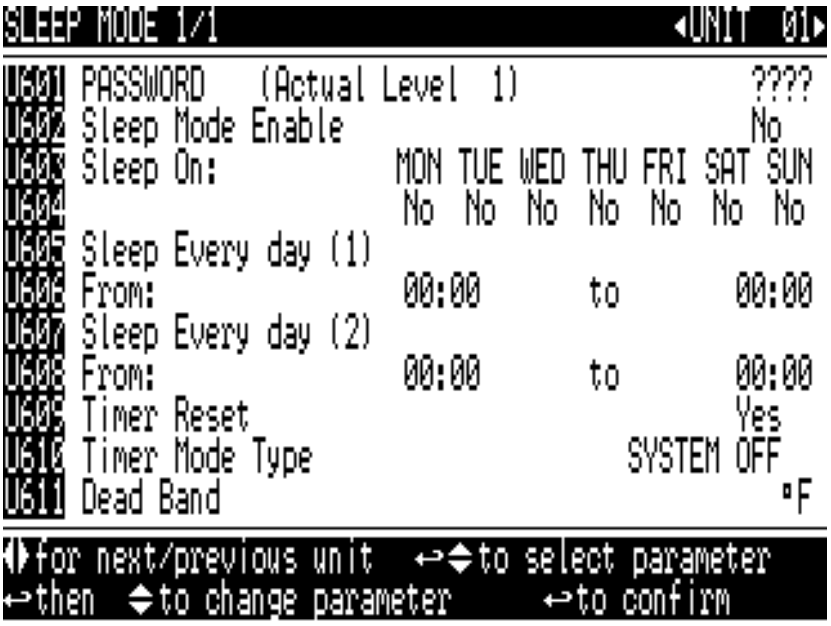
Figure 99 Total run hours screen


TOTAL RUN HOURS 1/1
◂UNIT 01▸
U500 Actual Hours Limit
U502 Fan Motor(s) 545 0
U503 Compressor 1 0 0
U504 Compressor 2 0 0
U505 Chilled Water 0
U506 Free Cool 0 0
U507 HotGas / HotWater 0 0
U508 Electric Heater 1 542 0
U509 Electric Heater 2 542 0
U510 Electric Heater 3 184 0
U511 Humidifier 0 0
U512 Dehumidification 0 0
U513

7.7 User-Sleep Mode Menu Screens

The Sleep Mode menu contains parameters to set back or allow unit to turn Off during non-peak hours. Sleep Mode may be interrupted if the temperature rises above threshold set in the Set Alarms menu.

Figure 100Sleep mode screen


SLEEP MODE 1/1
UNIT 01
U601 PASSWORD (Actual Level 1) ????
U602 Sleep Mode Enable No
U603 Sleep On: MON TUE WED THU FRI SAT SUN
U604 No No No No No No No
U605 Sleep Every day (1)
U606 From: 00:00 to 00:00
U607 Sleep Every day (2)
U608 From: 00:00 to 00:00
U609 Timer Reset Yes
U610 Timer Mode Type SYSTEM OFF
U611 Dead Band °F
for next/previous unit ↵ to select parameter
↵then to change parameter ↵to confirm

U609 Timer Reset—Defines when the unit changes back to Sleep Mode after having crossed the high or low temp threshold (Deadband setting on line U611). These values are available:

- NO: The user can use this setting to temporary interrupt a sleep mode interval while sleep mode is active. If the parameter is left at No, sleep mode will not resume until the next sleep mode interval occurs or the user sets the parameter back to Yes or Auto.
- YES: If the unit is brought out of sleep mode by a hi or low temperature event, the unit continue to operate and will go to Sleep Mode again at the next coming Interval.
- Auto: The unit will automatically return to sleep mode if interrupted by a high- or low-temperature event. The temperature must be within 50% of the temperature dead band before the unit will resume sleep mode.

U610 Timer Mode Type—Defines what will happen when sleep mode is active. Two options are available:

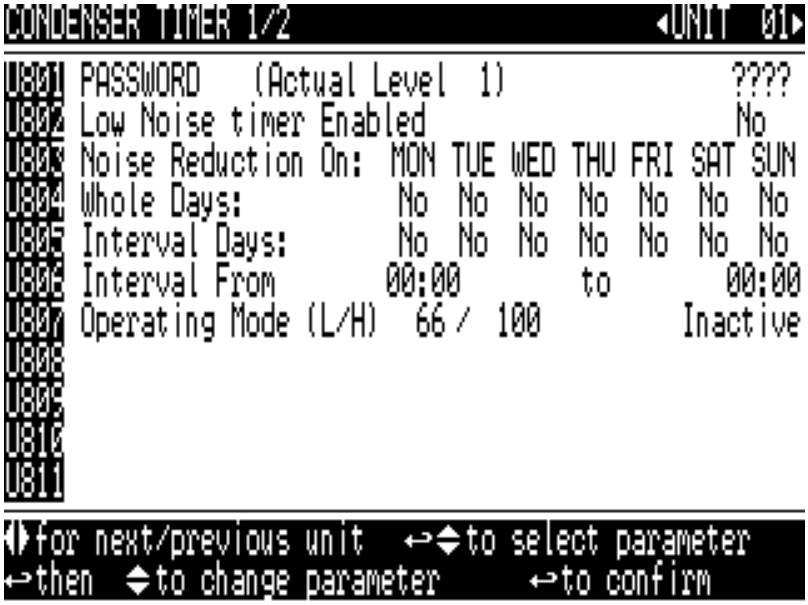
- System Off: the unit remains Off, no fans cooling etc. High- and low-temperature events will not bring the unit out of sleep mode.
- Deadband: Provides the user with a selectable deadband range to bring a unit out of sleep mode if the temperature in the space gets too high or low. The deadband is defined on line U611.This setting also allows the unit to come out of sleep mode if a high- or low-temperature alarm occurs. Temperature alarm thresholds are (internally) shifted lower / higher by the half value U611.

U611 Dead Band—Defines when a unit will come out of sleep mode when U610 is set for Dead Band. This deadband is added to the temperature dead band in Service Menu, Setpoints. Once the control temperature increases above Temperature Setpoint + (1/2 [Temperature Dead Band]) + U611, the unit will turn On. The unit will remain operating until the temperature is within 1/2 (Temperature Dead Band).

7.8 User-Condenser Timer Menu Screens

The Condenser Timer menu applies to Liebert units coupled to a Liebert MC™ outdoor condenser connected through CANbus communication.

Figure 101 Condenser timer screen—page 1


CONDENSER TIMER 1/2
UNIT 01
U801 PASSWORD (Actual Level 1) ????
U802 Low Noise timer Enabled No
U803 Noise Reduction On: MON TUE WED THU FRI SAT SUN
U804 Whole Days: No No No No No No No
U805 Interval Days: No No No No No No No
U806 Interval From 00:00 to 00:00
U807 Operating Mode (L/H) 66 / 100 Inactive
U808
U809
U810
U811
for next/previous unit ↵to select parameter
↵then to change parameter ↵to confirm

U802 Low Noise Timer Enabled—Sets the low noise operations of the condenser fan. When the parameter is set to "YES" the low noise operation is selected. When set to "NO," the low noise will be disabled even if a schedule is set below. Low noise may be overridden by calculated gain sequence at the global condenser to prevent a high-pressure situation.

U803 Noise Reduction On—Lists the day(s) that low noise feature can be scheduled if U802 is set to "YES".

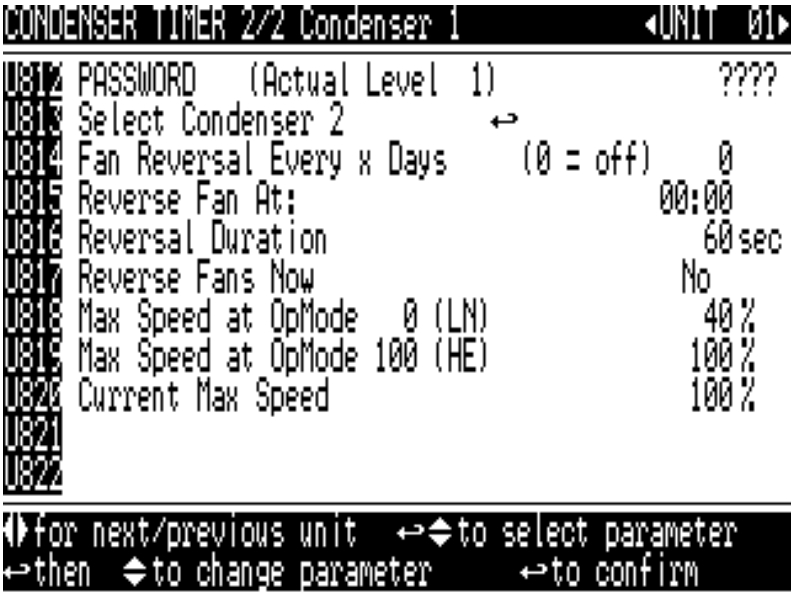
U804 Whole Days—Selects the whole day(s) low noise operations will be available for the condenser fan. When the parameter is set to "YES" the low noise operation is selected for the whole day. When set to "NO" the low noise will be disabled.

U805 Interval Days—Selects the interval day(s) low noise operations will be available for the condenser fan. When the parameter is set to "YES" the low noise operation is selected. When set to "NO" the low noise will be disabled even if an interval time is set below.

U806 Interval From—Selects the time of day that the low noise feature will be enabled between 00:00 and 24:00.

U807 Operating Mode (0=LN, 100=HE)—The first value represents the fan speed during low noise operation. The second value represents the fan speed during normal or high efficiency operation. The first value is linked to U818 and the second to U819.

Figure 102 Condenser timer screen—page 2


CONDENSER TIMER 2/2 Condenser 1 ◂UNIT 01▸
U812 PASSWORD (Actual Level 1) ????
U813 Select Condenser 2 ↩
U814 Fan Reversal Every x Days (0 = off) 0
U815 Reverse Fan At: 00:00
U816 Reversal Duration 60 sec
U817 Reverse Fans Now No
U818 Max Speed at OpMode 0 (LN) 40 %
U819 Max Speed at OpMode 100 (HE) 100 %
U820 Current Max Speed 100 %
U821
U822
◂▸for next/previous unit ↩⬍to select parameter
↩then ⬍to change parameter ↩to confirm

U813 Select Condenser 2—This menu selection toggles between condenser 1 and 2. When "Select Condenser 2" is shown the data below is for condenser 1. When "Select Condenser 1" is shown, the data below is for condenser 2.

U814 Fan Reversal Every x Days—Selection defines the numbers of days between fan reversals. This parameter is adjustable from 1-100 days. The default set value is 0 days = OFF. Fan reversal can only be preformed with both compressors satisfied. Fan reversal interval should be preformed during standby periods. If the compressor is operating, the control with skip the scheduled reversal and retry the next interval day. If the scheduled fan reversal is missed, the control will look for the next available time to do a fan reversal where the compressors calls are met and initiate the reversal.

U815 Reverse Fan At:—Selection defines what time the fan reversal will be performed in 00:00 to 24:00.

U816 Reversal Duration—Selection defines the length of time the fan(s) will be operated in reverse. This parameter is adjustable from 0-999 seconds. The default set value is 60 seconds.

U817 Reverse Fans Now—Selection performs a rotation when parameter is set to "YES." When selection is set to "YES" the parameter will automatically change back to "NO" when the timer, U816, has elapsed. NOTE: If one or both of the compressor(s) are in operation and/or the fan is in a low noise operation the request to reverse the fans will be ignored. When the conditions above are met to reverse the fans the control will perform a reversal.

U818 Max Speed at OpMode 0 (LN)—Linked to U807 0=LN column and defines the maximum speed during Low Noise operation.

U819 Max Speed at OpMode 100 (HE)—Linked to U807 100=HE column and defines the maximum speed during normal or High Efficiency operation.

U820 Current Max Speed—Parameter show the status of the actual maximum fan speed.

Configuring Low Noise Operation

First, determine the days and time of day low noise is required. This will be set U806 through U808 respectively. Second, determine the maximum fan speed setting during low noise operation.

In this example, the user does not want fan speed to exceed 35% max speed from 10 pm to 8 am weekdays.

1. Set U805 Mon-Fri columns to yes.
2. Set U806 inverval time from 22:00 to 8:00
3. U807 = 0% / 100%
4. U818 = 35% (Max fan speed low noise)
5. U819 = 100% (Max fan speed during normal operation)

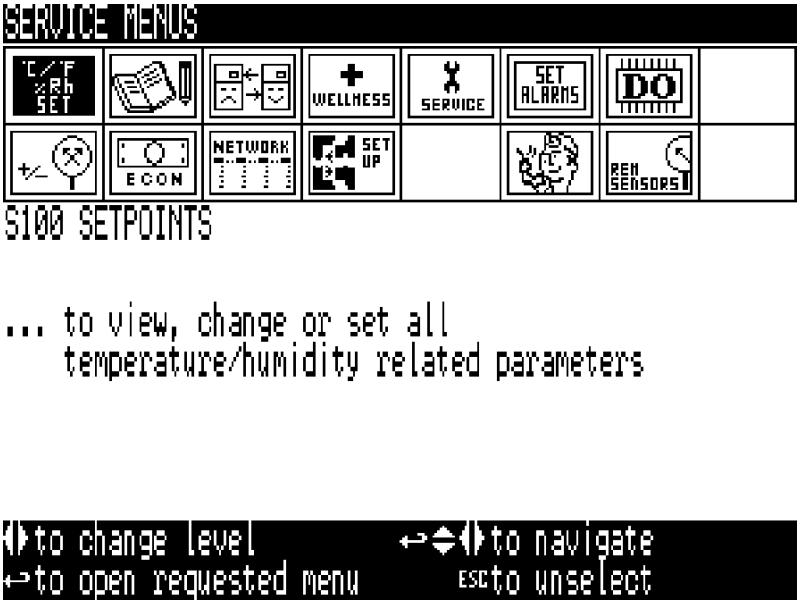
The settings above result in a 35% maximum speed when the timer is active (i.e., at night) and will operate the fan between 0 and 100% maximum speed of when the timer is inactive (normal operation, during daytime).

8.0 SERVICE MENU PARAMETERS

Service menus allow customized settings for site operations. The password for service menu parameters is **5010.**

The Liebert iCOM firmware is being updated constantly. As a result, the Service menu parameter tables shown in this manual may be slightly different than what is shown on your cooling unit's display. Please check **www.liebert.com** for the latest Liebert iCOM User manual updates.

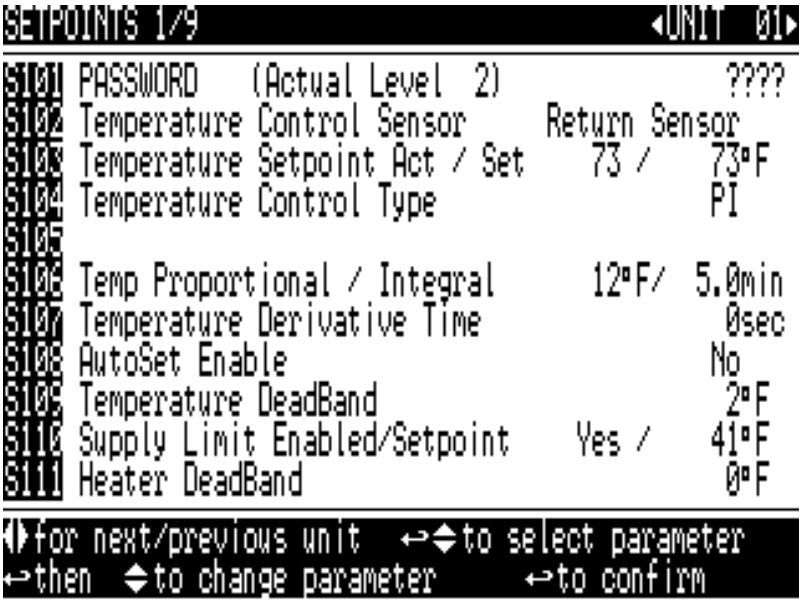
Figure 103 Service Menu Main Screen



8.1 Service-Setpoints Menu Screens

Setpoints allow the user to view, change and set all temperature- and humidity-related parameters.

Figure 104 Setpoints screen, page 1 of 9


SETPOINTS 1/9
UNIT 01
S101 PASSWORD (Actual Level 2) ????
S102 Temperature Control Sensor Return Sensor
S103 Temperature Setpoint Act / Set 73 / 73°F
S104 Temperature Control Type PI
S105
S106 Temp Proportional / Integral 12°F/ 5.0min
S107 Temperature Derivative Time 0sec
S108 AutoSet Enable No
S109 Temperature DeadBand 2°F
S110 Supply Limit Enabled/Setpoint Yes / 41°F
S111 Heater DeadBand 0°F
for next/previous unit
to select parameter
then
to change parameter
to confirm

S102 Temperature Control Sensor—Selects which sensor will be controlling the cooling capacity. Cooling capacity is either the Chilled Water Valve, Compressor, FreeCooling Valve or Air Economizer. Unloading type compressors can be set to any sensor type, however fixed style compressors can only be set to Return or Remote control type l. This parameter can only be changed in the service menu. The range is Supply, Return or Remote Sensor. The factory default setting is Return.

S103 Temperature Setpoint Act/Set—Selects a return temperature that the cooling unit will maintain by applying cooling and or reheats. This is adjustable from 41-104°F (5-40°C). The factory default is 73°F (22.7°C).

There are two values in this field. The Temp Set value is the temperature that has been set by the user to control the temp. The Temp Act value is a read only value that indicates if another routine, like supply compensation has internally modified the Temp controlling value. If compensation has not been activated, then the ACT and SET will always match. This parameter is adjustable from 41-104°F (5-40°C). The default set value for Supply is 64°F. The default set value for Return and Remote is 73°F.

S104 Temperature Control Type—Sets the type of control to be followed Proportional, PI or Intelligent.

S106 Temperature Proportional /Integral—Adjusts the activation points of compressors or rate of change based on the actual sensor values deviation from setpoint. The smaller this number the faster the compressors and valve(s) will increase capacity. Too small of a number may cause the unit to short cycle the compressors or excessively reposition the valve.

S107 Temperature Integration Time—Adjusts the capacity of the unit based on time away from setpoint so that accurate temperature control can be maintained. The proportional and integral work together to maintain setpoint. Large P-Band with Small I-Time is typical when controlling to supply air.

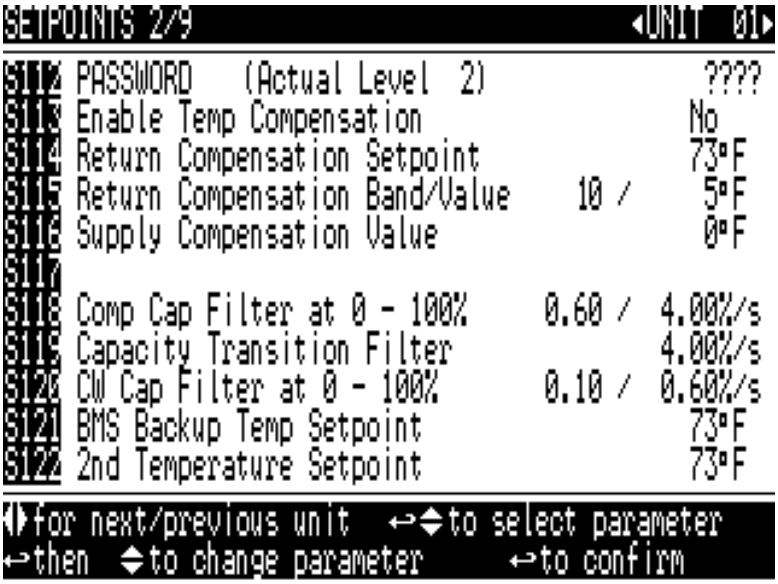
S108 AutoSet Enable—Sets the temperature and humidity proportional bands automatically based on the type of unit when this parameter is set to “YES” and if teamwork modes are selected. To change the proportional bands, this parameter must be set to “NO”. If supply or remote sensors are used, then this value is always set to “No.”

S109 Temperature Deadband—Avoids overshooting of the setpoint and cycling between the reheats and cooling. The value entered in this field will be split in half by the temperature setpoint. Example: If the temperature setpoint is 70°F (21.1°C) and a 4°F (2.2°C) deadband is set, then no cooling will be activated until 72°F (22.2°C) and no heating will be activated until 68°F (20°C) is reached.

S110 Supply Limit Enabled/Setpoint—Chilled water units may be set up with the supply air sensor to maintain a minimum air temperature under a raised floor to help prevent condensation. In order to avoid supply temperatures that are too low, the Supply Limit can influence the opening of three-point or analog actuators or the output of analog valves. The control compares the deviation from the return air setpoint and the supply limit setpoint, and calculates the output to the actuator from the smaller deviation.

S111 Heater Deadband—Changes the amount of deviation below the temperature setpoint that the heaters will cycle On and Off on Liebert HPM™ units. This value is added to the heating side of the normal temperature deadband.

Figure 105 Setpoints screen, page 2 of 9


SETPOINTS 2/9
UNIT 01
S112 PASSWORD (Actual Level 2) ????
S113 Enable Temp Compensation No
S114 Return Compensation Setpoint 73°F
S115 Return Compensation Band/Value 10 / 5°F
S116 Supply Compensation Value 0°F
S117
S118 Comp Cap Filter at 0 - 100% 0.60 / 4.00%/s
S119 Capacity Transition Filter 4.00%/s
S120 CW Cap Filter at 0 - 100% 0.10 / 0.60%/s
S121 BMS Backup Temp Setpoint 73°F
S122 2nd Temperature Setpoint 73°F
for next/previous unit ↵ to select parameter
↵then to change parameter ↵to confirm

S113 Enable Temp Compensation—Temperature compensation allows for a second or even a third sensor to be used that will influence the units cooling or heating. Return compensation can be used when the supply or remote sensors are being used for control. Then the return sensor is then monitored to maintain a minimum return temperature.

Supply compensation can be used only when Optimized Aisle is enabled. The supply sensor will not only be used for controlling cooling capacity but will also monitor the cold aisle temp to ensure that the cold aisle temperature setpoint is met.

S114 Return Compensation Setpoint—The temperature setpoint where compensation begins to operate by increasing the supply air setpoint.

S115 Return Compensation Band/Value—The return compensation band / value will determine how quickly the cooling capacity is adjusted as the return temperature drops below the return compensation setpoint.

S116 Supply Compensation Value—The Supply Compensation value determines how much the supply temperature setpoint will be reduced when the units fan speed is at 100% and the cold aisle is not able to maintain temperature setpoint.

Any modifications to the supply temperature setpoint will be shown at the temperature setpoint on parameter S103 as the actual active control point.

S118 Comp Cap Filter at 0-100%—Controls the rate of change during comp load changes to avoid overshoots. The filter value depends on the current control deviation from the setpoint.

On the setpoint (at 0%), it's typically set lower (slow), and at the end of the P-band (at 100%) it's typically set higher (faster). The value is given in % control output change per second.

S119 Capacity Transition Filter—This parameter should only be adjusted by a factory-service trained technician. The transition capacity filter controls how quickly the capacity changes between different modes of operation.

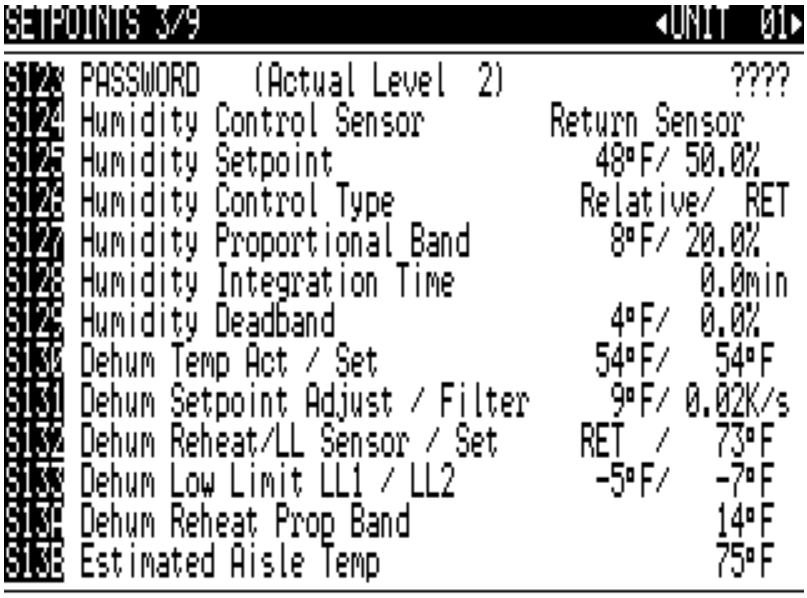
This filter helps with the transition to avoid overshoot.

S120 CW Cap Filter at 0 - 100%— The CW Filter at 0% / 100% Controls the rate of change during a valve position adjustment to avoid overshoots. The filter value depends on the current control deviation from the setpoint. On the setpoint (at 0%), it's typically set lower (slow), and at the end of the P-band (at 100%) it's typically set higher (faster). The value is given in % control output change per second.

S121 BMS Backup Temp Setpoint—Selects a temperature setpoint that will be activated in the event of a BMS Timeout. The BMS timer must be configured for this parameter to activate.

S122 2nd Temperature Setpoint—Selects a temperature setpoint that will be activated in the event of a customer input signal configured as the second setpoint. The customer input must be configured for this parameter to activate.

Figure 106 Setpoints screen, page 3 of 9


SETPOINTS 3/9
UNIT 01
S123 PASSWORD (Actual Level 2) ????
S124 Humidity Control Sensor Return Sensor
S125 Humidity Setpoint 48°F/ 50.0%
S126 Humidity Control Type Relative/ RET
S127 Humidity Proportional Band 8°F/ 20.0%
S128 Humidity Integration Time 0.0min
S129 Humidity Deadband 4°F/ 0.0%
S130 Dehum Temp Act / Set 54°F/ 54°F
S131 Dehum Setpoint Adjust / Filter 9°F/ 0.02K/s
S132 Dehum Reheat/LL Sensor / Set RET / 73°F
S133 Dehum Low Limit LL1 / LL2 -5°F/ -7°F
S134 Dehum Reheat Prop Band 14°F
S135 Estimated Aisle Temp 75°F

NOTE

When the unit is in relative humidity control, only the right side of the menu is displayed and dew point will display the left side of the menu.

S124 Humidity Control Sensor—Defines which humidity value the humidity setpoint is compared with. The return sensor is equipped with a Temp / Hum sensor and can calculate the dew point based on iCOM's internal lookup table. If a sensor other than the return sensor is selected, then Liebert iCOM will calculate the corresponding RH% based on that sensors actual temperature. The Range is Remote or Return Sensor. The factory default setting is Return Sensor.

S125 Humidity Setpoint—Selects a humidity that the cooling unit will maintain by removing or adding moisture to the air. The humidity setpoint will either be set in percent RH or as a Dew Point Value depending on what the humidity control type is set for. This parameter is adjustable from 20-80%. The factory default setting is 50%.

S126 Humidity Control Type—Selects the humidity control calculation. Setting this parameter to "Relative" will control the humidity without considering any temperature deviations. "Predictive" and "Absolute" control consider the temperature deviation from temperature setpoint so that a constant level of moisture is kept in the area based on the humidity sensor reading and the temperature deviation from setpoint. The factory default setting is "Predictive" (see **3.7.2 - Humidity Sensor Reading Control Types**).

S127 Humidity Proportional Band—Adjusts the activation points of the humidifier and compressors based on the actual sensor values deviation from setpoint. The smaller this number, the faster the compressors and humidifier will increase capacity. Too small of a number may cause the unit to short cycle or overshoot setpoint.

S128 Humidity Integration Time—Adjusts the capacity of the unit based on time away from setpoint so that accurate humidity control can be maintained. If the integration time is set to 0, the humidity control operates as a "proportional only" control. When an integration time is set, the control mode changes to "PI" control.

S129 Humidity Deadband—Prevents overshooting of the setpoint and cycling between humidification and dehumidification. The value entered in this field will be split in half by the temperature setpoint.

S130 Dehum Temp Act/Set—Allows for a target temperature setpoint to be activated when a call for dehumidification is enabled instead of the traditional method of overcooling the space by increasing cooling to 100% and lowering fan speed if equipped. Must be in supply air control mode.

When a call for dehumidification is active, the supply or remote sensor setpoint will be lowered to this parameter. This parameter should be set below the accepted dew point threshold of your space.

Used only when supply dehumidification is enabled.

S131 Dehum Setpoint Adjust/Filter—Sets the amount that the Dehum Temp Setpoint is adjusted when the reheats activate. Example: If the unit is equipped with a reheat device, this parameter will increase the dehumidification temperature as the call for reheats are increased until the reheat call is at 100%. When the reheats are at 100%, the full Dehum Setpoint Adjustment will be applied.

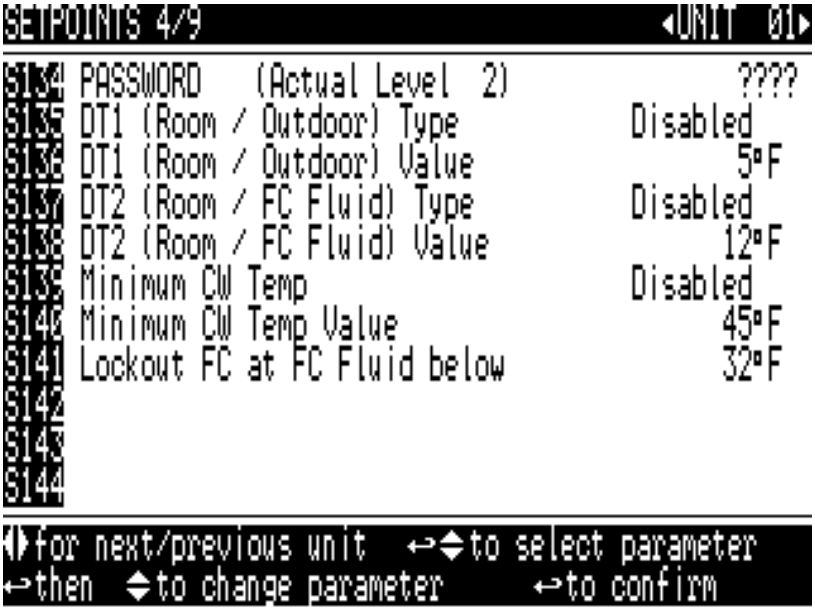
S132 Dehum Reheat/LL Sensor/Set—Sets the sensor and temperature start point that the reheat will be deactivated and dehumidification will be stopped due to overcooling the space in a call for dehumidification.

S133 Dehum Low Limit 1 LL1/LL2—Dehum Low Limit 1; Dehum Low Limit 2.

S134 Dehum Reheat Prop Band2—Sets the reheat proportional band for reheat operation independently of the temperature proportional band. This parameter can be used to activate the reheats at different points below the temperature setpoint.

S135 Estimated Aisle Temp—Sets an estimated cold aisle temperature when humidity control sensor is set to remote and no remote temp sensors are installed at the unit. This estimated temperature will be used to determine the humidity versus using an actual temperature in the cold aisle that may fluctuate during modes of dehumidification or load changes of the IT equipment. This provides a stable control point to reference the actual measured dew point from the return sensor.

Figure 107 Setpoints screen, page 4 of 9


SETPOINTS 4/9
◂UNIT 01▸
S134 PASSWORD (Actual Level 2) ????
S135 DT1 (Room / Outdoor) Type Disabled
S136 DT1 (Room / Outdoor) Value 5°F
S137 DT2 (Room / FC Fluid) Type Disabled
S138 DT2 (Room / FC Fluid) Value 12°F
S139 Minimum CW Temp Disabled
S140 Minimum CW Temp Value 45°F
S141 Lockout FC at FC Fluid below 32°F
S142
S143
S144
◂▸for next/previous unit ↩⬍to select parameter
↩then ⬍to change parameter ↩to confirm

S135 DT1 (Room/Outdoor) Type—Sets the activation point of the ambient dry bulb outdoor temperature as it relates to either an indoor actual temperature or temperature setpoint. See **3.4.3 - Liebert Air Economizer Control Menu Settings** for more information.

S136 DT1 (Room/Outdoor) Value—Field-adjustable setpoint or temperature. Type (setpoint or temperature) is based on the setting on S135.

S137 DT2 (Room/FC Fluid) Type—Determines the method to activate the water circuit on Dual-Cool and free-cool units. It may be set to CONTACT, TEMP or SET. CONTACT which uses a dry contact to activate the free-cooling circuit. TEMP uses a sensor reading that can then be compared to the return temp to see whether free-cooling is possible. SET compares the temperature SET to the free-cooling sensor to determine free-cooling availability.

S138 DT2 (Room/FC Fluid) Value—Sets the delta between the actual temperature and fluid temperature that must be met before free-cooling will occur.

Example: Actual Temperature = 75°F

Free-cooling Temperature = 70°F

DT2 Value = 4

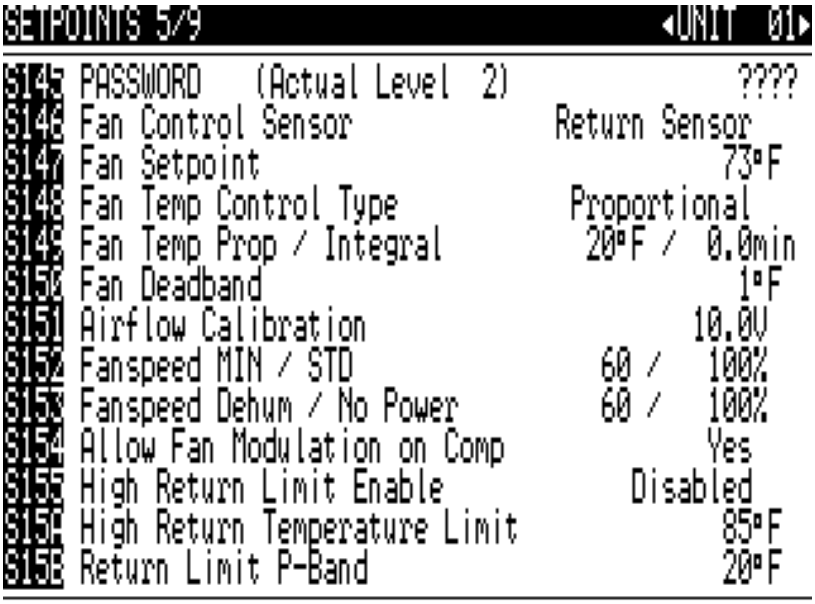
Since the difference between the free-cooling fluid and the actual temperature is 5°F and the DT2 value is set to 4°F, then free-cooling would be utilized.

S139 Minimum CW Temp—Enables the temperature at which free-cooling can operate independently without assistance of the compressor circuit(s).

S140 Minimum CW Temp Value—Sets the water temperature at which 100% free-cooling can be provided to handle the full room load. When the fluid temperature is below this setting, then the compressors will no longer turn On until the water temperature is above the minimum CW Temp.

S141 Lockout FC at FC Fluid below—Prevents frost from building up on the free-cooling pipes when the outdoor ambient is extremely low by turning Off the free-cooling circuit when the water temperature is too low.

Figure 108 Setpoints screen, page 5 of 9


SETPOINTS 5/9
◂UNIT 01▸
S145 PASSWORD (Actual Level 2) ????
S146 Fan Control Sensor Return Sensor
S147 Fan Setpoint 73°F
S148 Fan Temp Control Type Proportional
S149 Fan Temp Prop / Integral 20°F / 0.0min
S150 Fan Deadband 1°F
S151 Airflow Calibration 10.0V
S152 Fanspeed MIN / STD 60 / 100%
S153 Fanspeed Dehum / No Power 60 / 100%
S154 Allow Fan Modulation on Comp Yes
S155 High Return Limit Enable Disabled
S156 High Return Temperature Limit 85°F
S156 Return Limit P-Band 20°F

S146 Fan Control Sensor—Controls the fan speed for modulation. Options for this setting are Supply, Return, Remote, and Manual Mode.

If manual mode is selected, then the fan speed can be controlled from the local display or through a building management system.

S147 Fan Setpoint—Activated when a temperature sensor is being used to control the fan speed. If the same sensor is used for temperature control and fan speed control, then this value will reflect the same setpoint as the temperature control setpoint. Manual mode uses the Fan Speed STD for control.

S148 Fan Temp Control Type—Sets the type of control the unit will use to control fan speed.

PI controls gain is set in the Temp Prop / Integral parameter.

PI control will operate the fan speed so that the actual temperature of the fan control sensor is equal to the fan temp setpoint. If proportional only is selected, the fan will change “ONLY” based on the deviation from setpoint which will allow the actual temp to settle higher than setpoint.

S149 Fan Temp Prop/Integral—Adjusts the fan speeds rate of change based on the actual sensor values deviation from setpoint. The smaller this number, the faster the fans will increase speed. Too small of a number may cause the fans to increase decrease and overshoot setpoint.

Temperature Integration Time—Adjusts the fans of the unit based on time away from setpoint so that accurate temperature control can be maintained. The proportional and integral work together to maintain setpoint. Large P-Band with Small I-Time is typical to achieve a stable control.

S150 Fan Deadband—Avoids overshooting of the setpoint. The value entered in this field will be split in half by the fan speed setpoint.

S151 Airflow Calibration—Allows the front display to be scaled to show the actual percentage of airflow independent of the voltage operating the fan speed. This value cannot be set above the Analog Output High Limit or below the Analog Low Limit for the fan set in the Advanced Menu. This also includes the service menu fan speed parameters.

S152 Fanspeed Min/STD—Sets the range for the variable fans. Min sets the minimum speed that the fan will operate at. Fan speed is modulated between the MIN and STD based on which sensor is set to control, setpoint and the PI settings. If the controlling sensor is set to manual, then the STD setting will control the current fan speed. This parameter is also adjustable through the BMS.

S153 Fanspeed Dehum/No Power—Sets the fan speed when a call for dehumidification is active. This allows the units fan speed to be ramped lower to help with any overcooling due to the dehumidification process. This also allows the coil to remove additional moisture even faster.

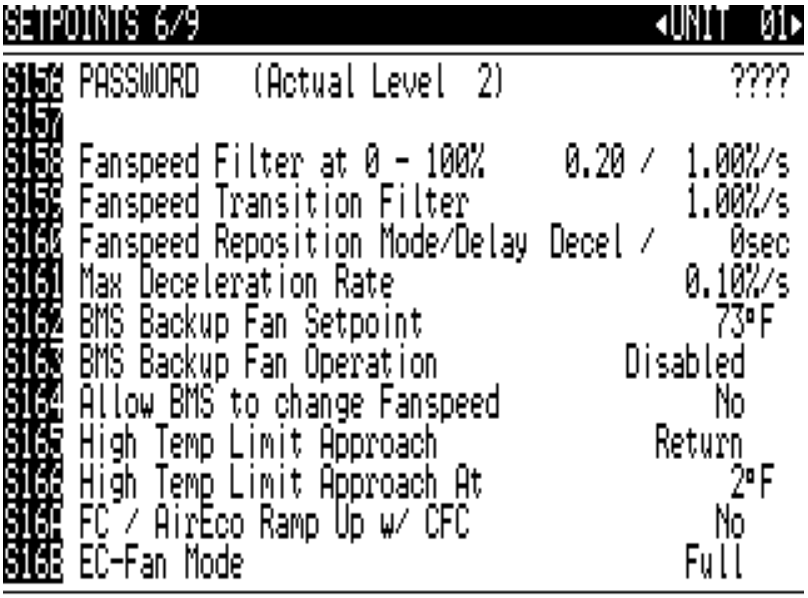
S154 Allow Fan Modulation on Comp—Provides the option to set the fan to fixed speed if unit is equipped with compressors. Once this parameter is set at the local display, it must be removed at the local display to re-engage fan speed control.

S155 High Return Limit Enable—Sets a control point that will increase the fanspeed if the return temperature exceeds the limit set in the High Return Temperature Limit parameter. If set to DISABLED, no limit will be applied to the return air temperature. If set to LOCAL, then only the local units return temperature will be monitored for applying the limit. If set to TEAM, then the highest networked unit return temperature will activate the limit on all connected units.

S15A High Return Temperature Limit—Sets the temperature limit that will increase the fan speed to decrease the return temperature. Some compressors may require this limit to prevent extremely high return temperatures that could potentially cause degradation of the compressor oil, that could decrease the overall compressor life expectancy.

S15B Return Limit P-Band—Sets the rate of fanspeed increase as the actual return temperature approaches the limit set in the High Return Temperature Limit parameter.

Figure 109 Setpoints screen, page 6 of 9


SETPOINTS 6/9
◂UNIT 01▸
S15D PASSWORD (Actual Level 2) ????
S15F
S160 Fanspeed Filter at 0 - 100% 0.20 / 1.00%/s
S161 Fanspeed Transition Filter 1.00%/s
S162 Fanspeed Reposition Mode/Delay Decel / 0sec
S163 Max Deceleration Rate 0.10%/s
S164 BMS Backup Fan Setpoint 73°F
S165 BMS Backup Fan Operation Disabled
S166 Allow BMS to change Fanspeed No
S167 High Temp Limit Approach Return
S168 High Temp Limit Approach At 2°F
S169 FC / AirEco Ramp Up w/ CFC No
S16B EC-Fan Mode Full

S158 Fanspeed Filter at 0-100%—This parameter should only be adjusted by a factory service trained technician. Fan Cap Filter at 0% / 100% controls the rate of change during fan speed changes to avoid overshoots. The filter value depends on the current control deviation from the setpoint. On the setpoint (at 0%), it's typically set lower (slow), and at the end of the P-band (at 100%) it's typically set higher (faster). The value is given in % control output change per second. This parameter sets the rate of change based on where actual temp is when compared to setpoint.

S159 Fanspeed Transition Filter—This parameter should only be adjusted by a factory service trained technician. The transition fan speed filter controls how quickly the fan speed changes between different modes of operation. For example, if the fans are operating based on a call for reheat which is normally 100% fan speed and the reheats are turned Off or no longer needed then the fan speed would instantly change if this filter is not applied, which may cause instability in the fan speed control. This filter helps with the transition to avoid overshoot.

S160 Fanspeed Reposition Mode/Delay Decel/—This parameter should only be adjusted by a factory service trained technician. The fan speed reposition mode / delay is a one time delay as the fan speed is requested to change direction. This delay will be applied only when the fan speed is commanded from an increasing to decreasing state or a decreasing to increasing state. This allows the fan to hold its current position while the temperature stabilizes.

S161 Max DecelerationRate—This parameter should only be adjusted by a factory service trained technician. Only slows the decreasing of the variable fan speed. The control will use the slower of this parameter and the fan speed filter.

S162 BMS Backup Fan Setpoint—Selects a fan speed setpoint that will be activated in the event of a BMS Timeout. The BMS timer must be configured for this parameter to activate.

S163 BMS Backup Fan Operation—Sets the default operation for the fan speed control when a BMS Timeout occurs. Default is disabled which will keep the fan speed at the last value before the disconnect occurred. STD speed will ramp the fan to the STD speed setting. This will drive the fan speed to its maximum speed. The control will use the slower of this Coupled will set the fan speed to follow the cooling capacity. Backup Set will use the BMS Backup setpoint to drive fan speed.

S164 Allow BMS to change Fanspeed—Enables or disables BMS fan speed control. When this parameter is disabled, the BMW will not have write capability to this point.

S165 High Temp Limit Approach—Sets the sensor to be used to increase the fanspeed value above the fanspeed setpoint STD to the value set in the Analog Out high limit. This parameter is selectable from Disabled, Supply and Return. The factory default is Return.

S166 High Temp Limit Approach At—Sets the temperature differential below the high supply and high return temperature limit where the fan speed would increase from fanspeed setpoint STD to fanspeed MAX. This parameter is selectable from 0 - 10°F. The factory default is 2°F.

S16A FC / AirEco Ramp Up w/CFC—Sets the selection to decouple the fan output from the call for cooling. This parameter is selectable from No or Yes. The factory default is No.

S16B EC-Fan Mode—Shows the status of the EC-Fan Mode. When the selection is shown as *full*, the normal fanspeed control is being utilized. When the selection is shown as *light*, the fan control sensor is forced to manual. This is used for the Liebert HPM™ only.

Figure 110 Setpoints screen, page 7 of 9

SETPOINTS 7/9
UNIT 01
S167 PASSWORD (Actual Level 2) ????
S168 Fan Back Draft Control Disabled
S169 VSD Setpoint BACK DRAFT 1.5V
S170
S171 Not Selectable Zone 1 3.5/ 4.9V
S172 Not Selectable Zone 2 0.0/ 0.0V
S173 Stop BDR when System is Off No
S174 Remote Off and BDR Off
S175 Display Off and BDR Off
S176 BMS Off and BDR Off
S177 LOC Off and BDR Off
for next/previous unit ↵ to select parameter
↵then to change parameter ↵to confirm

S168 Fan Back Draft Control—Enables or disables the Back Draft fan control. This feature allows EC Fans (only) to operate at very low speeds to prevent airflow from cycling through the unit due to a higher under-floor static pressure than the above floor static pressure. VFD's cannot be used with this feature due to motor and or bearing degradation that may occur at the low fan speeds required to support this feature.

S169 VSD Setpoint BACK DRAFT—The variable speed device setpoint is set as a voltage reference. The lower the voltage, the slower the fans will spin. This parameter is set based on the application. Higher under-floor static pressure may require a higher setting to prevent air flow through the unit.

S171 Not Selectable Zone 1—The not selectable zone 1 and 2 are zones that the EC fans cannot operate within due to vibration harmonics that the fans may introduce to the unit. These parameters will be set from the factory based on model type and should not need adjusted in the field.

S172 Not Selectable Zone 2—The not selectable zone 1 and 2 are zones that the EC fans cannot operate within due to vibration harmonics that the fans may apply to the units frame. These parameters will be set from the factory based on model type and should not need adjusted in the field.

S173 Stop BDR when System is Off—The above is true when S173 **Stop BDR when System is Off** is set to "Yes." If S173 is set to 'No' the BDR mode will not be interrupted, unless BDR is disabled or the unit is restarted.

S174 Remote Off and BDR (Liebert HPM™ only)—Active when terminals factory supplied RSD 37 + 38 are open. SFA fan wiring required for operation. Do not use this feature when the doing an fire system with the RSD. Contact Liebert Services for assistance.

WARNING

Risk of electrical shock. Can cause injury and death.

Never use any of these functions—Remote Off, Display Off, BMS Off, LOC Off—in place of lockout/tagout procedures.

Some internal components of Liebert cooling units require and receive power even during the Unit Off mode of the Liebert iCOM.

The factory-supplied optional disconnect switch is inside the Liebert cooling unit. The line side of this switch contains live high voltage.

The only way to ensure that there is NO voltage inside the unit is to install and open a remote disconnect switch. Refer to the unit electrical schematic.

Follow all local codes.

S175 Display Off and BDR—When the back draft damper is enabled, different modes can activate this feature. Remote Off, Display Off, BMS Off and Local Off can all be set to activate the back draft damper operation. This is done pressing the I/O key at the unit to put the unit is a display OFF condition.

S176 BMS Off and BDR—When the back draft damper is enabled, different modes can activate this feature. Remote Off, Display Off, BMS Off and Local Off can all be set to activate the back draft damper operation. This is done by sending a remote OFF signal from BMS to the unit to be remotely OFF.

S177 LOC Off and BDR—When the back-draft damper is enabled, different modes can activate this feature. Remote Off, Display Off, BMS Off and Local Off can all be set to activate the back draft damper operation. This is done by sending a local OFF signal from the unit by pressing I/O key.

Figure 111 Setpoints screen, page 8 of 9

SETPOINTS 8/9
◂UNIT 01▸
S176 PASSWORD (Actual Level 2) ????
S177 SCR Control Type No
S180 Start 1st Compressor At 0%
S181 Stop 1st Compressor At -200%
S182 1st Compressor Stop Delay 20min
S183 Start 2nd Compressor At 100%
S184 Stop 2nd Compressor At 0%
S185 2nd Compressor Stop Delay 0min
S186 Cycle Time 1.0sec
S187 SCR Factor 1.0
S188 Actual SCR Request 100%
◂▸for next/previous unit ↵⬍to select parameter
↵then ⬍to change parameter ↵to confirm

S178 SCR Control Type—Sets the control type for the SCR reheats. If set to "Standard," then the reheats will modulate when the temperature is below setpoint based on the control settings. If this parameter is set to "Tight" control, then one compressor will be locked on and the reheats will modulate to offset the cooling capacity.

S179 Fanspeed Transition Filter—Controls how quickly the fan speed changes between different modes of operation. Example: If the fans are operating based on a call for reheat which is normally 100% fan speed and the reheats are turned Off or no longer needed, then the fan speed would instantly change if this filter is not applied, which may cause instability in the fan speed control. This filter helps with the transition to avoid overshoot. This parameter should only be adjusted by a factory service trained technician.

S180 Start 1st Compressor At—Sets the activation point of the compressor. This parameter can be used when set to "Tight" control.

S181 Stop 1st Compressor At—Sets the deactivation point of the compressor. This parameter can be used when set to "Tight" control.

S182 1st Compressor Stop Delay—Sets the delay when the stop compressor setpoint for the first compressor is met.

S183 Start 2nd Compressor At—Sets the activation point of the second compressor. This parameter can be used when set to "Tight" control.

S184 Stop 2nd Compressor At—Sets the deactivation point of the second compressor. This parameter can be used when set to "Tight" control.

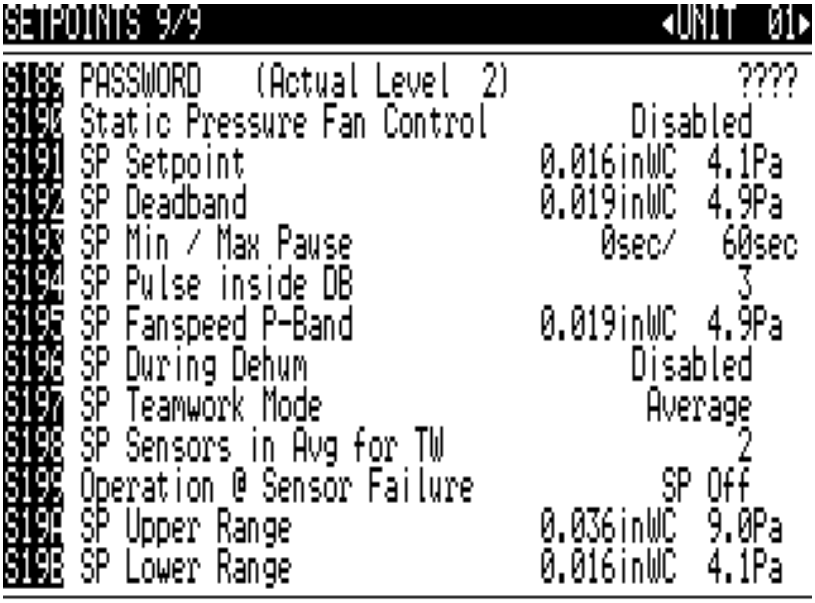
S185 2nd Compressor Stop Delay—Sets the delay when the stop compressor setpoint for the second compressor is met.

S186 Cycle Time—Set at the factory and should be changed only by an authorized Emerson representative.

S187 SCR Factor—Set at the factory and should be changed only by an authorized Emerson representative.

S188 Actual SCR Request—Displays the actual SCR reheat being requested.

Figure 112 Setpoints screen, page 9 of 9


SETPOINTS 9/9
◂UNIT 01▸
S188 PASSWORD (Actual Level 2) ????
S190 Static Pressure Fan Control Disabled
S191 SP Setpoint 0.016inWC 4.1Pa
S192 SP Deadband 0.019inWC 4.9Pa
S193 SP Min / Max Pause 0sec/ 60sec
S194 SP Pulse inside DB 3
S195 SP Fanspeed P-Band 0.019inWC 4.9Pa
S196 SP During Dehum Disabled
S197 SP Teamwork Mode Average
S198 SP Sensors in Avg for TW 2
S199 Operation @ Sensor Failure SP Off
S19A SP Upper Range 0.036inWC 9.0Pa
S19B SP Lower Range 0.016inWC 4.1Pa

S190 Static Pressure Fan Control—Enables or Disables the use of static pressure control for fan modulation. This parameter is selectable between Disabled and Enabled. The factory default is Disabled.

S191 SP Setpoint—Sets the static pressure setpoint to be used by the control to modulate fan control. This parameter is selectable from 0.010 - 1.003 inWC. The factory default is 0.020 inWC.

S192 SP Deadband—Sets the static pressure deadband. This parameter is selectable from 0.010 - 1.003 inWC. The factory default is 0.020 in WC.

S193 SP Min / Max Pause—Sets the minimum and maximum pauses times when the static pressure crosses into the deadband border. The fanspeed will stop increasing or decreasing based on the time set in these parameters. This parameter are selectable from 0-180 sec for SP Min and the default is 30 sec and parameter SP Max is selectable from 2-180 sec and the default is 60 sec.

S194 SP Pulse inside DB—Sets the pulse time that the speed filter, S158, will be performed to the fan analog output. This parameter is 2-15 sec and the default is 3 sec.

S195 SP Fanspeed P-Band—Sets the proportional band for which the fanspeed modulation output calculation is based upon in relation to the difference between the pressure reading and the "SP Setpoint." This parameter is selectable from 0.010 - 1.003 in WC. The factory default is 0.020 inWC.

S196 SP During Dehum—Sets the use of static pressure control if dehumidification becomes active. If set to Disabled then the static pressure routines will become inactive and the fan will be allowed to ramp to the dehumidification speed set on line S153. If set to Enabled then the static pressure routines shall remain active during the call for dehumidification. This parameter is selectable between Enabled and Disabled. The default is disabled.

S197 SP Teamwork Mode—There are modes available for static pressure teamwork functionality: Average and Minimum. When selecting the Average Mode: the average of the lowest static pressure readings in the system will be averaged to generate a shared static pressure value for all units in the team. The number of static pressure sensors to be averaged is set on line S198. When this number is set to a value lower than the number of units in the team, the lowest static pressure readings will be averaged.

When selecting the Minimum Mode: the lowest static pressure reading in the team will be applied to the entire team. This parameter is selectable between Average and Minimum. The factory default is Average.

S198 SP Sensors in Avg for TW—Sets the number of sensors used when averaging sensors in the team work. This parameter is selectable from 1-32. The factory default is 2.

S199 - Operation @ Sensor Failure—This parameter determines what action to take if the static pressure sensor fails (non-teamwork). There are two options to use when handling a static pressure sensor failure, they are SP OFF = static pressure control Off, where the control will use S146 to control the fan when the sensor is lost or Freeze Speed = keep the fanspeed unchanged based on the last reading to iCOM. Things that need to override fanspeed such as freeze protection can still change the fanspeed.

S19A SP Upper Range—The control calculates the Upper Range by using S191 "SP Setpoint" and S192 "SP Deadband," the results on lines show both values, in WC and Pa.

S19B SP Lower Range—The control calculates the Lower Range by using S191 "SP Setpoint" and S192 "SP Deadband," the results on lines show both values, in WC and Pa.

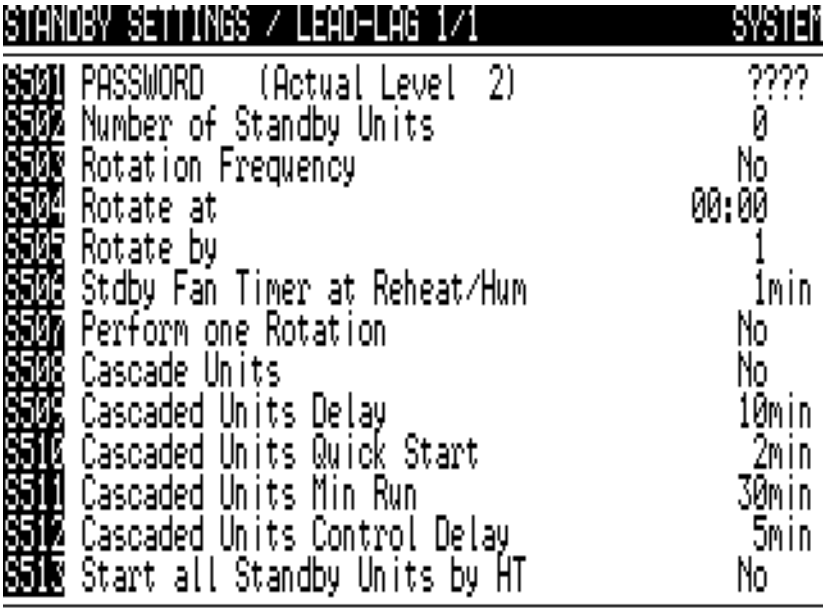
Service—Unit Diary Menu Screens (Large Display Only)

Unit Diary—Shows all entered program changes and maintenance performed on the unit. The Unit Diary serves as a note pad, where information can be added through the Liebert iCOM Service Tool.

8.2 Service—Standby Settings / Lead Lag Menu Screen

Standby Settings / Lead Lag allows the user program lead-lag setup when units are connected in a Liebert iCOM U2U network.

Figure 113 Standby settings / lead-lag screen


STANDBY SETTINGS / LEAD-LAG 1/1
SYSTEM
S501 PASSWORD (Actual Level 2) ????
S502 Number of Standby Units 0
S503 Rotation Frequency No
S504 Rotate at 00:00
S505 Rotate by 1
S506 Stdby Fan Timer at Reheat/Hum 1min
S507 Perform one Rotation No
S508 Cascade Units No
S509 Cascaded Units Delay 10min
S510 Cascaded Units Quick Start 2min
S511 Cascaded Units Min Run 30min
S512 Cascaded Units Control Delay 5min
S513 Start all Standby Units by HT No

S502 Number of Standby Units—Selects the number of units that will be in Standby mode. When a unit is in standby mode, the fan will be Off and no cooling will be provided.

S503 Rotation Frequency—Controls when a rotation will occur between the standby units and the operating units within a network.

S504 Rotate at—Sets the hour and minute of the rotation.

S505 Rotate by—Determines the number of positions to rotate by. Example: If there are six units in a unit-to-unit network and units 1, 3 and 5 are in standby and this parameter is set to "1," then at the next rotation units 2, 4 and 6 will be placed in standby and units 1, 3 and 5 will become operational.

S506 Stdby Fan Timer at Reheat/Hum—Sets the time that the fan will operate after a unit enters standby or sleep if the reheat or humidifier was operating when commanded to turn Off. Default is 30 minutes; range is 3 to 360 minutes.

S507 Perform one Rotation—Setting this parameter to YES will perform one rotation without waiting on the rotation timer to expire.

S508 Cascade Units—Allows units to activate in Standby mode if the room temperature cannot be maintained by the non-standby units. If "Yes" is selected, the cascaded units can perform all functions when activated from standby. This parameter can also be set for Cooling Only or Cool / Heat / Fan (available in TW3 only).

S509 Cascaded Units Delay—Sets the delay time to stage on each unit as they are staged on during increased demand. When the first unit is started and the cooling request is high enough to start the timer is started and once the timer has expired the next unit will start. This parameter range is 0-30 minutes. The factory default is 5 minutes.

S510 Cascaded Units Quick Start—Sets a delay to the staging on each unit after a power cycle of the master unit. This is used to get the units to start faster after a power cycle and use this parameter instead of S509. When the master unit is started and the cooling request is high enough to start the timer is started and once the timer has expired next unit will start. The control will not revert back to S509 until all required units have been restarted in cascade. This parameter range is 0-30 minutes. The factory default is 2 minutes.

S511 Cascaded Units Min Run—Sets a minimum run time after a commanded unit is turned On. The timer must expire before the unit can go back into standby. This parameter range is 2-360 minutes. The factory default is 30 minutes.

S512 Cascaded Units Control Delay

Teamwork Mode 1: Mode C: once the unit was started, the fanspeed control will start immediately, but the cooling / humidity control will be delayed by the value set in S512 Cascaded Units Control Delay. **Mode B**: the S512 timer is ignored; a cascaded unit starts control w/ no delay.

Teamwork Mode 3: All Modes: When the cascaded standby unit was started, the normal unit control is delayed by the value set in S512 Cascaded Units Control Delay. During this delay time, the fanspeed control and the cooling control uses the shared System values (based on AVG or MAX); heat, hum and dehumidification is disabled When the S512 timer has elapsed, the unit transitions to normal unit control, which is depending on the operating mode. This parameter range is 0-30 minutes. The factory default is 5 minutes.

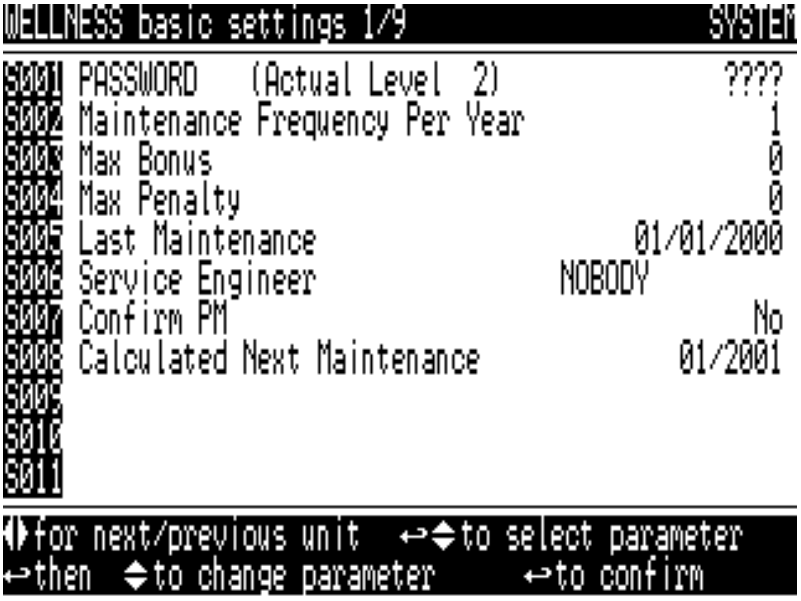
S513 Start all Standby Units by HT—Activates all units to cool when a High Temperature Alarm occurs.

8.3 Service-Maintenance / Wellness Menu Screens

Maintenance / Wellness Settings allow the user to set maintenance interval, maintenance message, read the number of starts / stops, and run hours since the last maintenance.

See below and **3.11.1 - Calculating Next Maintenance and Diagnostics** for additional details on these menu screens.

Figure 114 Wellness—Basic settings screen, page 1 of 9



S002 Maintenance Frequency Per year—Sets the number of expected maintenance visits in a one year time span.

S003 Max Bonus—Increases the time to the next maintenance cycle. Service personnel should assign a bonus when a service visit finds that all components are working optimally.

S004 Max Penalty—Decreases the time to the next maintenance cycle. Service personnel should assign a penalty when a service visit finds excessive wear on components.

S005 Last Maintenance—Indicates to service personnel the date of the last visit. This parameter is set during the service call.

S006 Service Engineer—Provides a label for the service representative to list either the company name or representative's name.

S007 Confirm PM—Confirms that the service representative has completed the preventive maintenance and resets the next maintenance date.

S008 Calculated Next Maintenance—Provides a date to when the next expected maintenance should take place based on the last confirmed PM, component starts, run hours and the penalty / bonus currently set in the Liebert iCOM.

Figure 115 Wellness—Motor settings screen, page 2 of 9

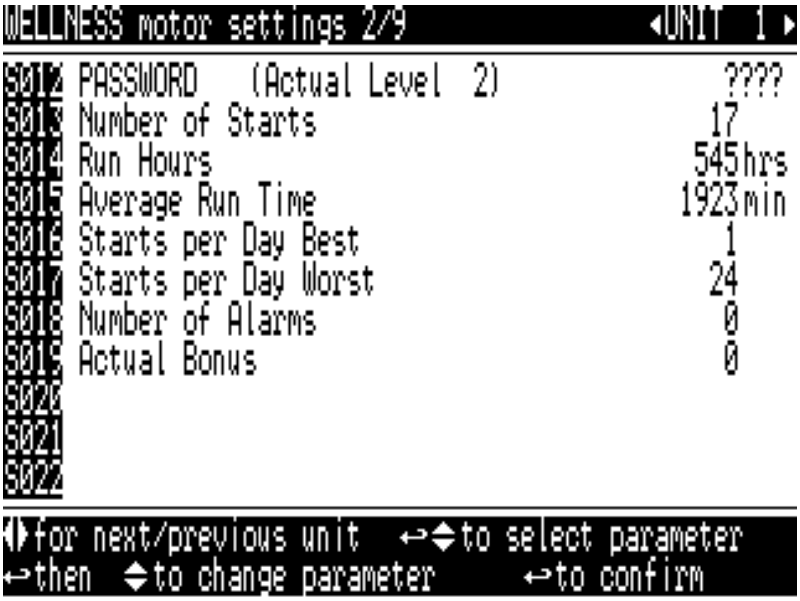

WELLNESS motor settings 2/9
◂UNIT 1 ▸
S013 PASSWORD (Actual Level 2) ????
S013 Number of Starts 17
S014 Run Hours 545hrs
S015 Average Run Time 1923min
S016 Starts per Day Best 1
S017 Starts per Day Worst 24
S018 Number of Alarms 0
S019 Actual Bonus 0
S020
S021
S022
◀▶for next/previous unit ↩◆to select parameter
↩then ◆to change parameter ↩to confirm

Figure 116 Wellness—Compressor 1 settings screen, page 3 of 9

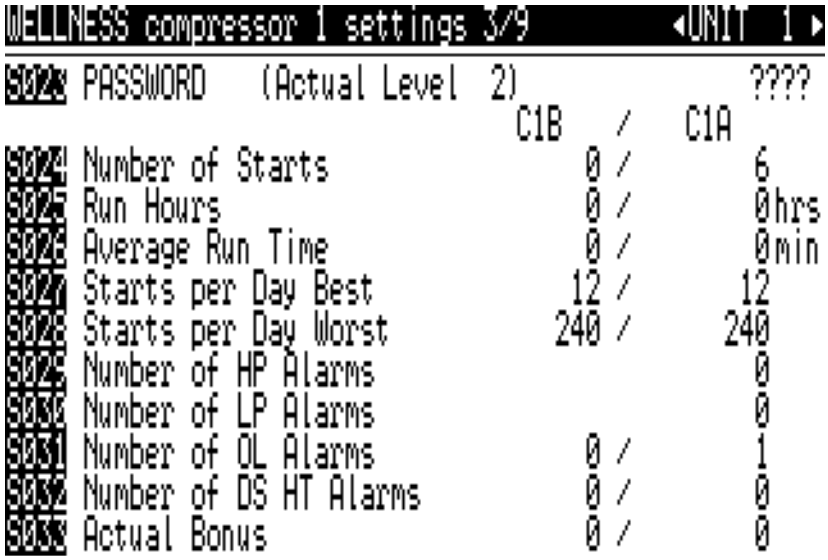

WELLNESS compressor 1 settings 3/9
◂UNIT 1 ▸
S023 PASSWORD (Actual Level 2) ????
C1B / C1A
S024 Number of Starts 0 / 6
S025 Run Hours 0 / 0hrs
S026 Average Run Time 0 / 0min
S027 Starts per Day Best 12 / 12
S028 Starts per Day Worst 240 / 240
S029 Number of HP Alarms 0
S030 Number of LP Alarms 0
S031 Number of OL Alarms 0 / 1
S032 Number of DS HT Alarms 0 / 0
S033 Actual Bonus 0 / 0

Figure 117 Wellness—Compressor 2 settings screen, page 4 of 9

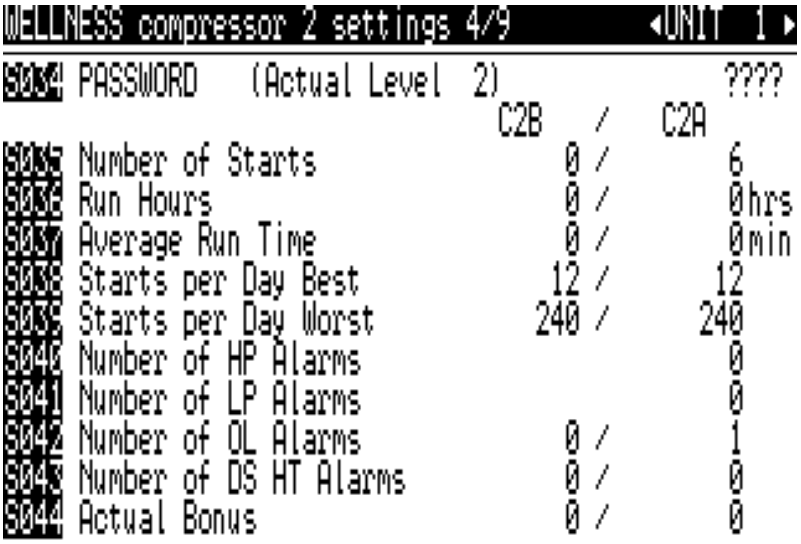

WELLNESS compressor 2 settings 4/9
UNIT 1
PASSWORD (Actual Level 2) ????
C2B / C2A
Number of Starts 0 / 6
Run Hours 0 / 0hrs
Average Run Time 0 / 0min
Starts per Day Best 12 / 12
Starts per Day Worst 240 / 240
Number of HP Alarms 0
Number of LP Alarms 0
Number of OL Alarms 0 / 1
Number of DS HT Alarms 0 / 0
Actual Bonus 0 / 0

Figure 118 Wellness—Electric heater 1 settings screen, page 5 of 9

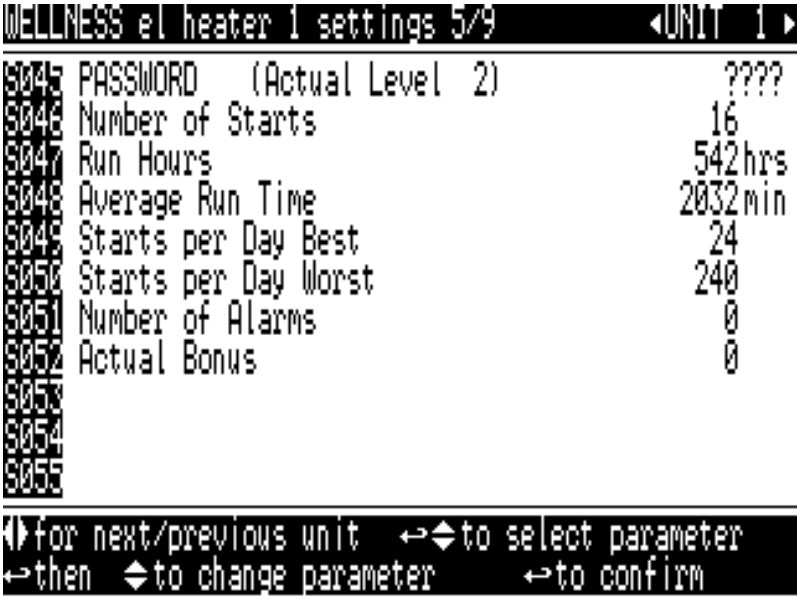

WELLNESS el heater 1 settings 5/9
UNIT 1
PASSWORD (Actual Level 2) ????
Number of Starts 16
Run Hours 542hrs
Average Run Time 2032min
Starts per Day Best 24
Starts per Day Worst 240
Number of Alarms 0
Actual Bonus 0
for next/previous unit to select parameter
then to change parameter to confirm

Figure 119 Wellness—Electric heater 2 settings screen, page 6 of 9

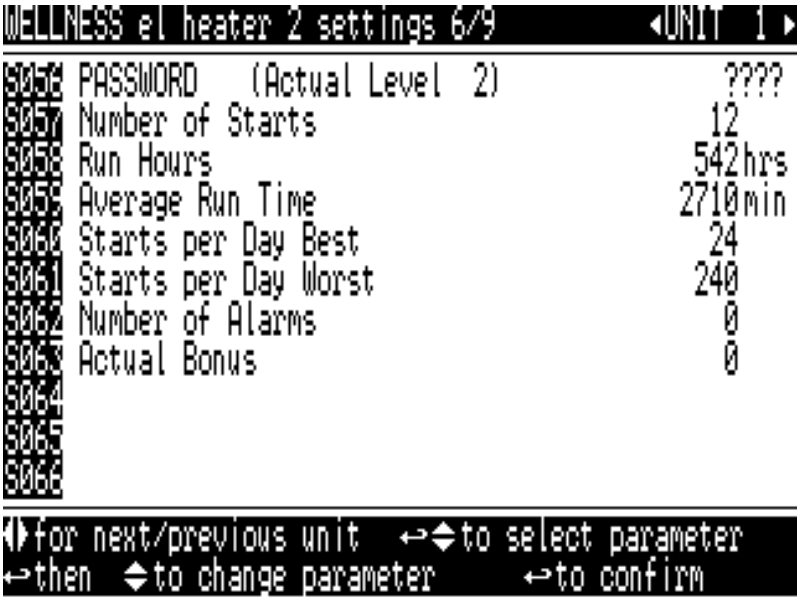

WELLNESS el heater 2 settings 6/9
UNIT 1
S056 PASSWORD (Actual Level 2) ????
S057 Number of Starts 12
S058 Run Hours 542 hrs
S059 Average Run Time 2710 min
S060 Starts per Day Best 24
S061 Starts per Day Worst 240
S062 Number of Alarms 0
S063 Actual Bonus 0
S064
S065
S066
for next/previous unit ↩to select parameter
↩then to change parameter ↩to confirm

Figure 120 Wellness—Electric heater 3 settings screen, page 7 of 9

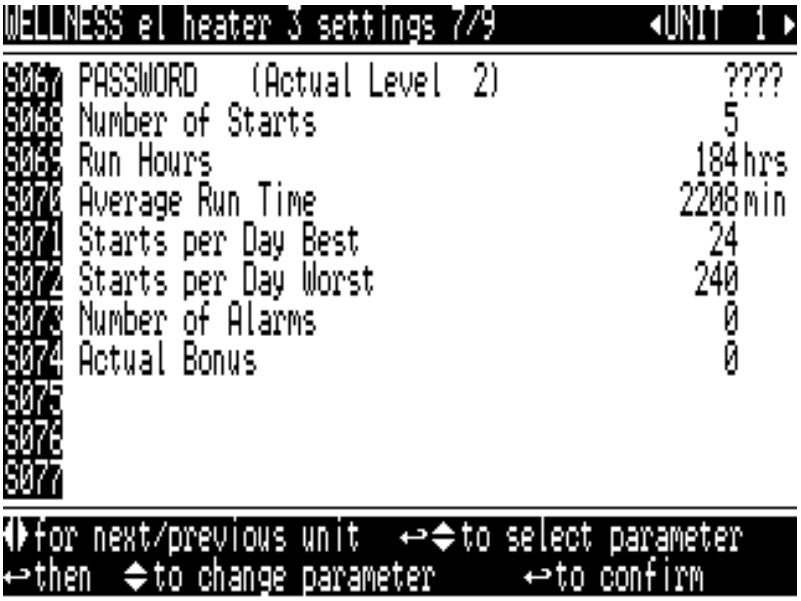

WELLNESS el heater 3 settings 7/9
UNIT 1
S067 PASSWORD (Actual Level 2) ????
S068 Number of Starts 5
S069 Run Hours 184 hrs
S070 Average Run Time 2208 min
S071 Starts per Day Best 24
S072 Starts per Day Worst 240
S073 Number of Alarms 0
S074 Actual Bonus 0
S075
S076
S077
for next/previous unit ↩to select parameter
↩then to change parameter ↩to confirm

Figure 121 Wellness—Humidifier settings screen, page 8 of 9

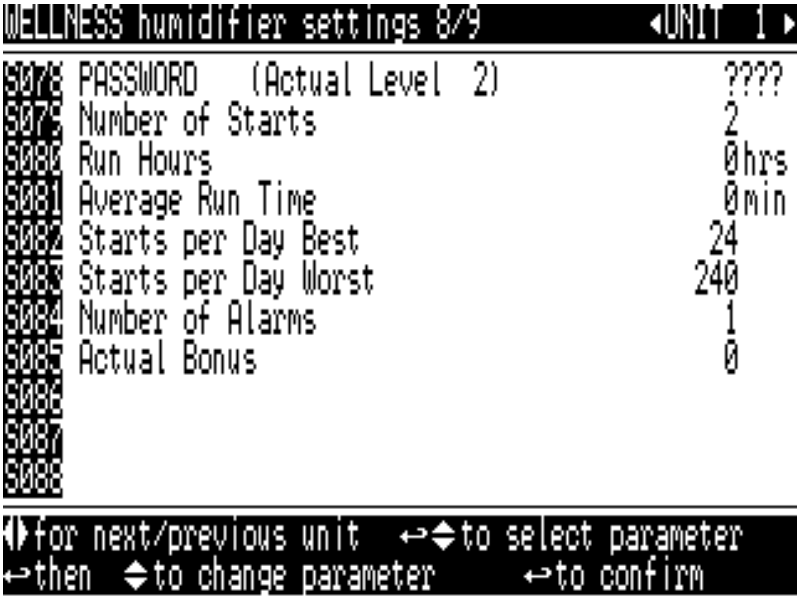

WELLNESS humidifier settings 8/9
UNIT 1
S076 PASSWORD (Actual Level 2) ????
S079 Number of Starts 2
S080 Run Hours 0hrs
S081 Average Run Time 0min
S082 Starts per Day Best 24
S083 Starts per Day Worst 240
S084 Number of Alarms 1
S085 Actual Bonus 0
S086
S087
S088
for next/previous unit ↵to select parameter
↵then to change parameter ↵to confirm

Figure 122 Wellness—Economizer settings screen, page 9 of 9

8.4 Service-Diagnostics / Service Mode Screens

Service-Diagnostics / Service Mode provides troubleshooting tools including alarm counters, manual mode, readable analog and digital inputs/outputs and other diagnostic features.

Figure 123 Diagnostics/service mode screen, page 1 of 8

DIAGNOSTICS / SERVICE MODE 1/8
◂UNIT 01▸
S301 PASSWORD (Actual Level 2) ????
S302 HP 1 Alarm Code 0
S303 HP 2 Alarm Code 0
S304 HT 1 Alarm Counter 0
S305 HT 2 Alarm Counter 0
S306 LP 1 Alarm Code 0
S307 LP 2 Alarm Code 0
S308 Actual LP1 Pressure 25psi
S309 Actual LP2 Pressure 35psi
S310 Actual HP1 Pressure 88psi
S311 Actual HP2 Pressure 233psi
◂▸for next/previous unit ↩◆to select parameter
↩then ◆to change parameter ↩to confirm

S302 HP 1 Alarm Code—Compressor 1 high pressure alarm code: 0 = no alarm; 2 = high-pressure alarm active.

S303 HP 2 Alarm Code—Compressor 2 high pressure alarm code: 0 = no alarm; 2 = high-pressure alarm active.

S304 HT 1 Alarm Counter—Compressor 1 high temperature event alarm counter. If more than five events in a rolling 4 hour period occur, then the compressor will be locked out.

S305 HT 2 Alarm Counter—Compressor 2 high temperature event alarm counter. If more than five events in a rolling 4 hour period occur, then the compressor will be locked out.

S306 LP 1 Alarm Code—Compressor 1 low-pressure alarm code: 0 = no alarm; 2 = low-pressure alarm active.

S307 LP 2 Alarm Code—Compressor 2 low-pressure alarm code: 0 = no alarm; 2 = low-pressure alarm active.

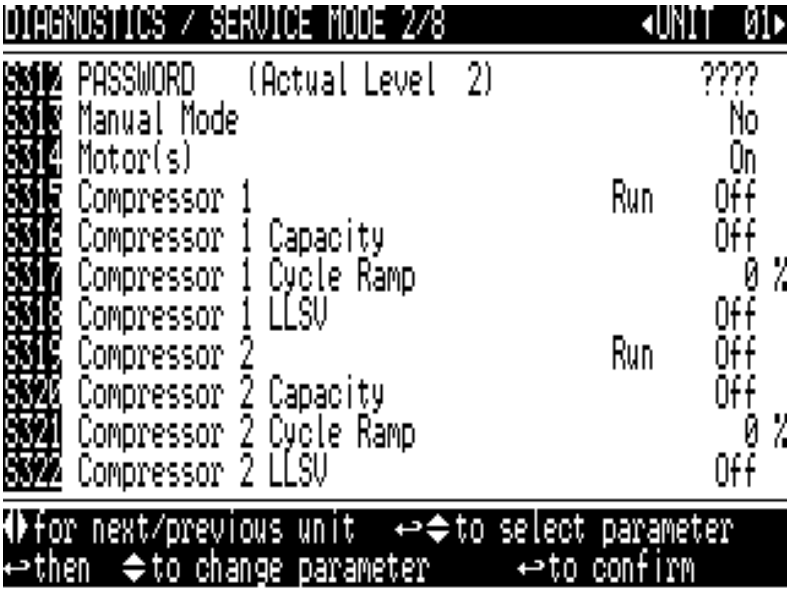
S308 Actual LP1 Pressure—Current refrigerant low pressure side reading in gauge for Compressor 1.

S309 Actual LP2 Pressure—Current refrigerant low pressure side reading in gauge for Compressor 2.

S310 Actual HP1 Pressure—Current refrigerant high pressure side liquid reading in gauge for Compressor 1. (This is available only on water cooled or glycol units equipped with motorized ball valves.)

S311 Actual HP2 Pressure—Current refrigerant high pressure side liquid reading in gauge for Compressor 2. (This is available only on water-cooled or glycol-cooled units equipped with motorized ball valves.)

Figure 124 Diagnostics/service mode screen, page 2 of 8


DIAGNOSTICS / SERVICE MODE 2/8
UNIT 01
S312 PASSWORD (Actual Level 2) ????
S313 Manual Mode No
S314 Motor(s) On
S315 Compressor 1 Run Off
S316 Compressor 1 Capacity Off
S317 Compressor 1 Cycle Ramp 0 %
S318 Compressor 1 LLSV Off
S319 Compressor 2 Run Off
S320 Compressor 2 Capacity Off
S321 Compressor 2 Cycle Ramp 0 %
S322 Compressor 2 LLSV Off
for next/previous unit ↵ to select parameter
↵ then to change parameter ↵ to confirm

S313 Manual Mode—Places the Liebert iCOM in manual mode. This is the initial setting necessary to activate any of the following items.

Manual Mode is used a diagnostic tool to test components and operation of the unit. This is useful when testing components such as fans, LLSV, compressors and actuators to validate operation and performance. To use manual mode, enter the level 2 password, *5010*, and select YES on line S313. With the exception of compressor evacuate mode, Manual Mode will time out after 30 minutes of inactivity. When finished running components in manual mode, change line S313 back to No. All the corresponding components changed with Manual Mode enabled will go back to normal. The unit will resume operation as it was before Manual Mode was enabled. Safety routines such as overload alarms, high pressure lockout, etc., will prevent some features from being used. If an alarm has been disabled but is active, some Manual Mode functions will not work.

S314 Motor(s)—Starts the unit's main fan. The main fan must be On before any of the following overrides can be activated. Compressor evacuate mode does not require motor(s).

S315 Compressor 1—Turns on Compressor 1 and selects the mode of compressor operation. The choices are RUN, EVACUATE and CHARGE. To access each mode, press the Enter key while highlighted on S315. Press the Right arrow key to advance to the left. The compressor mode may be changed by pressing the Up or Down arrow key. Once the desired mode is shown, press the Enter key. The compressor state to the far right must be placed to On if run or charge modes have been selected. No further action is required for evacuate mode.

- Run: This function allows the compressor to run at any given capacity. The compressor capacity can be adjusted on line S317.
- Evacuate: This function allows all solenoid valves in the refrigerant circuit to open while the compressor remains in Off. This mode is can be used for either leak checking or evacuation. This mode does not have a timeout period.
- Charge Mode: This function allows the compressor to run at 100% loaded capacity for 30 minutes at a time. The suction pressure must be at least 15 psi or the compressor will be stopped.

S316 Compressor 1 Capacity—Enables Compressor 1 Cycle Ramp.

S317 Compressor 1 Cycle Ramp—Selects the capacity the compressor should run at. The range is 20 to 100%.

S318 Compressor 1 LLSV—Shows the status of the liquid line solenoid valve for Compressor 1.

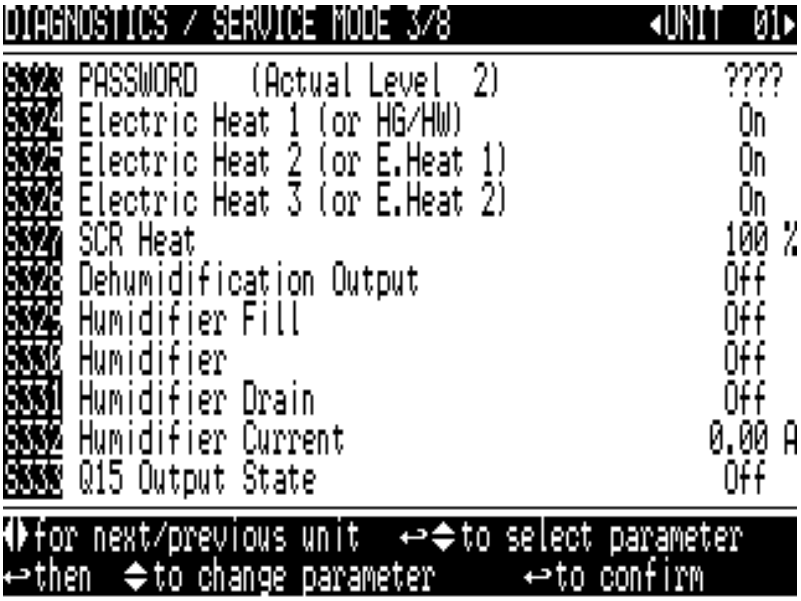
S319 Compressor 2—Turns on Compressor 2 and selects the mode of compressor operation. The choices are RUN, EVACUATE and CHARGE

S320 Compressor 2 Capacity—Enables Compressor 2 Cycle Ramp.

S321 Compressor 2 Cycle Ramp—Selects the capacity the compressor should run at. The range is 20 to 100%.

S322 Compressor 2 LLSV—Shows the status of the liquid line solenoid valve for Compressor 2.

Figure 125 Diagnostics/service mode screen, page 3 of 8


DIAGNOSTICS / SERVICE MODE 3/8 ◀UNIT 01▶
S323 PASSWORD (Actual Level 2) ????
S324 Electric Heat 1 (or HG/HW) On
S325 Electric Heat 2 (or E.Heat 1) On
S326 Electric Heat 3 (or E.Heat 2) On
S327 SCR Heat 100 %
S328 Dehumidification Output Off
S329 Humidifier Fill Off
S330 Humidifier Off
S331 Humidifier Drain Off
S332 Humidifier Current 0.00 A
S333 Q15 Output State Off
◀▶for next/previous unit ↩⬍to select parameter
↩then ⬍to change parameter ↩to confirm

S324 Electric Heat 1 (or HG/HW)—Activates Stage 1 of the unit's reheat system.

S325 Electric Heat 2 (or HG/HW)—Activates Stage 2 of the unit's reheat system.

S326 Electric Heat 3 (or HG/HW)—Activates Stage 3 of the unit's reheat system.

S327 SCR Heat—Specifies the pulse width the heating system should run at on units using silicon controlled rectifier type reheat.

S328 Dehumidification Output—(Read Only) On/Off status of dehumidification.

S329 Humidifier Fill—Activates the humidifier water source solenoid valve, which fills the humidifier pan or canister with water.

S330 Humidifier—Activates the humidifier system in its entirety.

S331 Humidifier Drain (Liebert HPM™ only)—Activates the humidifier drain solenoid, allowing water to drain from the canister if the unit is equipped with an optional the steam generating humidifier.

S332 Humidifier Current (Liebert HPM™ only)—Shows the amount of AC amperes the humidifier is consuming if the unit is equipped with an optional steam generating humidifier.

S333 Q15 Output State—Indicates the status of Q15 output.

Figure 126 Diagnostics/service mode screen, page 4 of 8

DIAGNOSTICS / SERVICE MODE 4/8 UNIT 01
S334 PASSWORD (Actual Level 2) ????
S335 Alarm Relay On
S336 K11 Relay Off
S337 3P 1/2 Actuator Open Off Off
S338 3P 1/2 Actuator Close Off Off
S339 BV Control Auto
S340 MBV Position 0 0 %
S341 Analog Out 1 0 %
S342 Analog Out 2 0 %
S343 Analog Out 3 100 %
S344 Analog Out 4 100 %
for next/previous unit ↵ to select parameter
↵then to change parameter ↵to confirm

S335 Alarm Relay—Activates the Liebert iCOM's common alarm relay output.

S336 K11 Relay—Activates the Liebert iCOM's free-cooling relay output.

S337 3P 1/2 Actuator Open—Energizes the open circuit of the 3P type chilled or free-cooling control valve. The 3P valve is easily identified because it will be controlled from P22 of the main board. Both values must be programmed On for the valve to modulate open. In addition, both values must be set to Off on 3P 1/2 Actuator Close before the open command will take effect.

S338 3P 1/2 Actuator Close—Energizes the close circuit of the 3P type chilled or free-cooling control valve. The 3P valve is easily identified because it will be controlled from P22 of the main board. Both values must be programmed On for the valve to modulate closed. In addition, both values must be set to Off on 3P 1/2 Actuator Open before the close command will take effect.

S339 BV Control—Activates the following two items allowing the motorized ball valve to be manually opened or shut.

S340 MBV Position—Specifies the percentage that Valve 1 should be open. Range is 0 to 100%.

NOTE

When the ball valve control is set to Auto, the motorized ball valve position will be adjusted to the set value, but the pressure control algorithm will immediately begin adjusting the valve to control the condenser pressure. When the ball valve control is set to Manual, the motorized ball valve position will be maintained as set. Emerson recommends against manually setting the motorized ball valve's during compressor operation because it might cause the compressor to trip on its high- or low-pressure protection controls.

S341-344 Analog Out 1, 2, 3 & 4—Specifies the analog output percentage subsequently controlling the device connected to that output. Range is 0 to 100% but also depends on the output's assignment in factory settings.

An Analog Output will may be used for internal purposes or for signaling values for the customer. The control for the Analog Output can be found in the Advanced - Factory Setting starting on page 7. Only factory-trained personnel may make changes in the Advanced Menu.

Figure 127 Diagnostics/service mode screen, page 5 of 8

DIAGNOSTICS / SERVICE MODE 5/8
◀UNIT 01▶
S345 Status Remote Shutdown On
S346 Status Airflow Loss Ok
S347 Motor Overload / EC Fan Fault Ok
S348 Status Filter Ok
S349 Status Customer Input 1 Water Alarm Ok
S350 Status Customer Input 2 Smoke Ok
S351 Status Customer Input 3 Flow Alarm Ok
S352 Status Customer Input 4 Stdby Unit Ok
S353 Status Heaters Safety Ok
S354 Loss Of Airflow At 40 %
S355 Actual Airflow 100 %
◀▶for next/previous unit ↩⬍to select parameter
↩then ⬍to change parameter ↩to confirm

Status Remote Shutdown—Shows the status of the unit's remote shut down input.

S346 Status Airflow Loss—Shows the status of the unit's air proof switch.

S347 Status Motor Overload / EC Fan Fault—Shows the status of the unit's main fan overload or EC fan fault input.

S348 Status Filter—Shows the status of the unit's filter clog switch input.

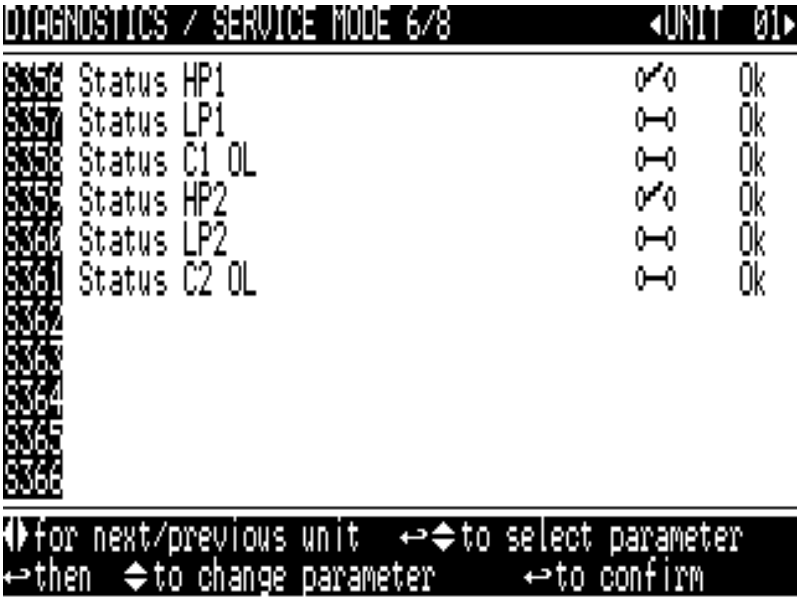
S349-352 Status Customer Input 1, 2, 3 & 4—Shows the status of the unit's customer inputs.

S353 Status Heaters Safety—Status shows the safety heaters switch.

S354 Loss of Airflow At—Sets the airflow at which the Loss of Airflow is activated. This parameter is adjustable from 0 to 100%. The factory default setting is 40%.

S355 Actual Airflow—Status shows the actual airflow based in percentage from 0-100%.

Figure 128 Diagnostics/service mode screen, page 6 of 8



S356 Status HP1—Shows the status of the unit's compressor 1 high pressure switch input.

S357 Status LP1—Shows the status of the unit's compressor 1 low pressure switch input.

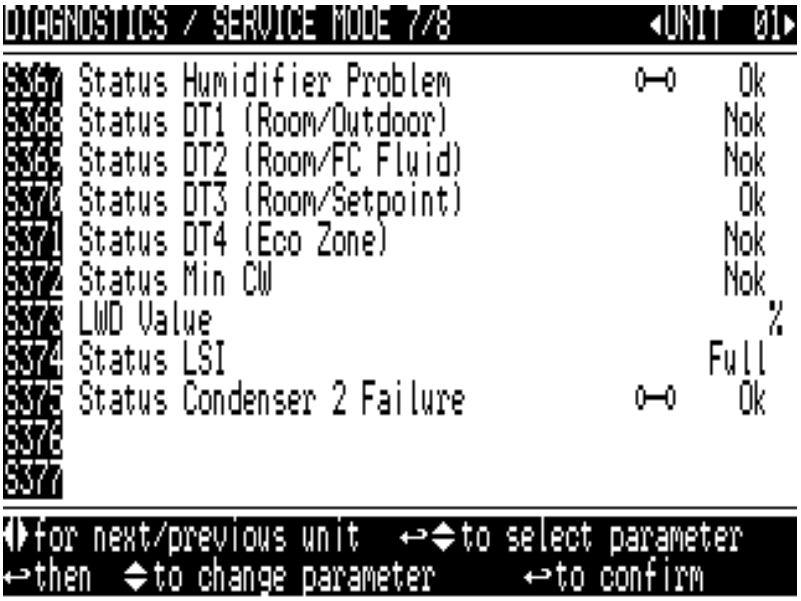
S358 Status C1 OL—Shows the status of the unit's compressor 1 overload input.

S359 Status HP2—Shows the status of the unit's Compressor 2 high pressure switch input.

S360 Status LP2—Shows the status of the unit's Compressor 2 low pressure switch input.

S361 Status C2 OL—Shows the status of the unit's Compressor 2 overload input.

Figure 129 Diagnostics/service mode screen, page 7 of 8



S367 Status Humidifier Problem—Shows the status of the high water level indicator on an infrared humidifier.

S368 Status DT1 (Outdoor/Glycol)—Indicates if the delta T between outdoor air ambient temperature and glycol fluid temperature has been met.

S369 Status DT2 (Glycol/Room)—Indicates if the delta T between glycol and room return air temperature has been met.

S370 Status DT3 (Room/Setpoint)—Indicates if the delta T between room return air temperature and unit air temperature setpoint has been met.

S371 Status DT4—Indicates the status of the Economizers ability to operate when looking at outdoor air, humidity and wet bulb. (Wet bulb applicable only on DX units).

S372 Status Min CW—Indicates if the free-cooling or chilled water temperature is below the minimum chilled water setpoint.

S373 LWD Value (Liebert HPM™ only)—Displays percent leakage from 0-100% on units with the optional analog Leakage Water Detector.

S374 Status LSI (Liebert HPM and Liebert PeX™ only)—Shows the status of the high water level indicator on units with variable capacity steam bottle humidifiers.

S375 Status Condenser 2 Failure (Liebert HPM only)—Shows the status of the Condenser 2 failure indicator.

Figure 130 Diagnostics/service mode screen, page 8 of 8

DIAGNOSTICS / SERVICE MODE 8/8
◂UNIT 1▸
S378 PASSWORD (Actual Level 2) ????
S379 Valve Control No Feedback
S380 Start Valve Calibration No
S381 Calibration Status Idle
S382 V1: 0% open = 3.90V
S383 V1: 100% open = 0.10V
S384 Current V1 Feedback 1.35V
S385 V2: 0% open = 3.90V
S386 V2: 100% open = 0.10V
S387 Current V2 Feedback 3.65V
S388
◂▸for next/previous unit ↩⬍to select parameter
↩then ⬍to change parameter ↩to confirm

S379 Valve Control—Controls the 3P valve(s). Control can be by either of two methods:

- A time-driven signal that uses a 3P valve's travel time and the time that an open or closed output is provided to a 3P valve to estimate its current position.
- A feedback signal from the valve that is required for Supply Air Control. The feedback signal constantly provides the Liebert iCOM with the valve's position, eliminating the need to reset the valve(s) on a loss of power and provides a valve failure detection.

S380 Start Valve Calibration—Changing this value to "Yes" starts the valve calibration procedure of the 3P Actuator. The unit must be powered down on the I/O key before calibration can be preformed. During this procedure, the valve is positioned to a fully closed and fully opened state while the feedback signal is monitored. The control then automatically saves the feedback signal voltage at the two end points as its calibration reference during normal operation.

S381 Calibration Status—Shows whether the calibration has been started: **idle** indicates calibration has not begun; **ongoing** indicates calibration has begun. When calibration has been completed, the status will return to idle.

S382 V1: 0% open = —Feedback voltage recorded when the valve is positioned at 0% during the calibration.

S383 V1: 100% open = —Feedback voltage recorded when the valve is positioned at 100% during the calibration.

S384 Current V1 Feedback—The valve's current feedback voltage. This value changes as the valve strokes to different open positions.

S385 V2: 0% open = —For an optional secondary valve; operates the same as the V1

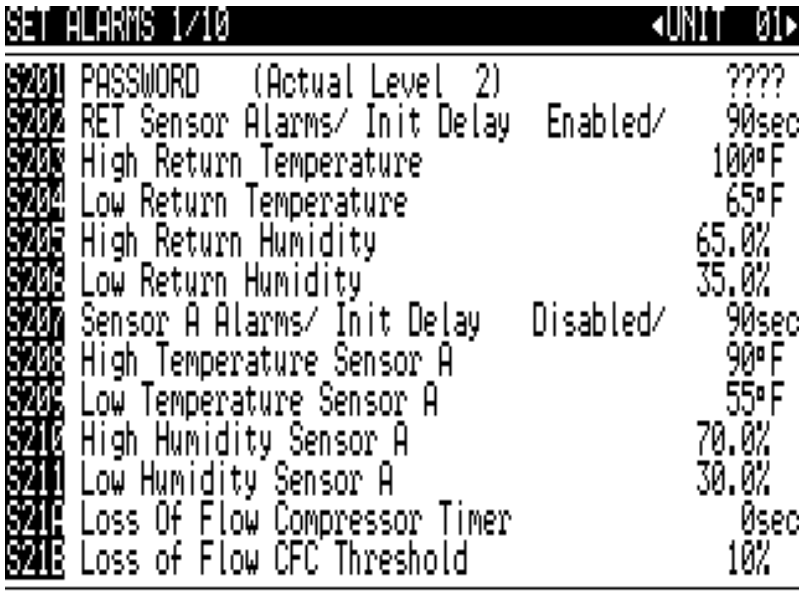
S386 V2: 100% open = —For an optional secondary valve; operates the same as the V1.

S387 Current V2 Feedback—For an optional secondary valve; operates the same as the V1.

8.5 Service-Set Alarms Menu Screens

Set Alarms allows the user to view and modify critical alarm thresholds, time delays, enable/disable alarms, modify event types and program custom alarm inputs.

Figure 131 Set alarms screen, page 1 of 10


SET ALARMS 1/10
◂UNIT 01▸
S201 PASSWORD (Actual Level 2) ????
S202 RET Sensor Alarms/ Init Delay Enabled/ 90sec
S203 High Return Temperature 100°F
S204 Low Return Temperature 65°F
S205 High Return Humidity 65.0%
S206 Low Return Humidity 35.0%
S207 Sensor A Alarms/ Init Delay Disabled/ 90sec
S208 High Temperature Sensor A 90°F
S209 Low Temperature Sensor A 55°F
S210 High Humidity Sensor A 70.0%
S211 Low Humidity Sensor A 30.0%
S21A Loss Of Flow Compressor Timer 0sec
S21B Loss of Flow CFC Threshold 10%

S202 Return Sensor Alarms—Enables and disables the return temperature and humidity sensor alarms. Factory default is set to enable.

S203 High Return Temperature—Sets the threshold temperature when a return high temperature alarm will occur.

S204 Low Return Temperature—Sets the threshold temperature when a return low temperature alarm will occur.

S205 High Return Humidity—Sets the threshold humidity when a return high humidity alarm will occur.

S206 Low Return Humidity—Sets the threshold humidity when a return low humidity alarm will occur.

S207 Sensor A Alarms—Enables or disables the alarms associated with Sensor A if the unit is equipped with the optional temperature / humidity sensor.

S208 High Temperature Sensor A—Sets the threshold temperature when a Sensor A high temperature alarm will occur.

S209 Low Temperature Sensor A—Sets the threshold temperature when a Sensor A low temperature alarm will occur.

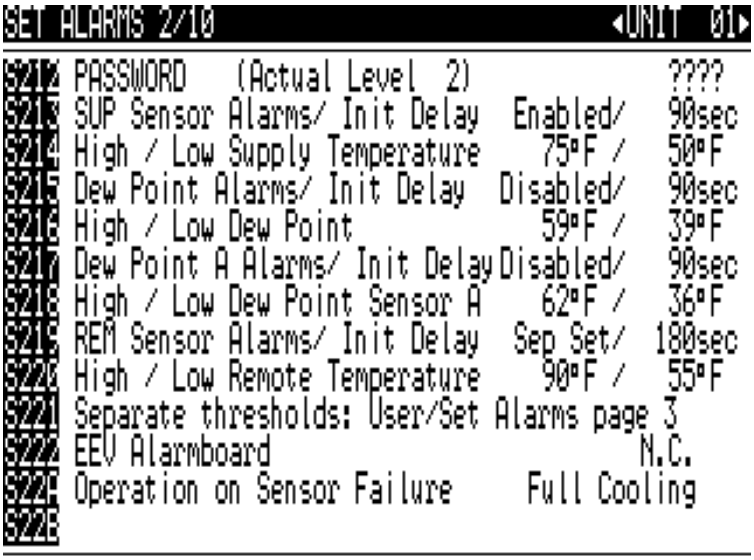
S210 High Humidity Sensor A—Sets the threshold humidity when a Sensor A humidity alarm will occur.

S211 Low Humidity Sensor A—Sets the threshold humidity when a Sensor A low humidity alarm will occur.

S21A Loss of Flow Compressor Timer—Allows setting a maximum pumpdown time during a loss of flow condition to prevent causing a high pressure alarm due to pumpdown with no water/glycol flow to the condenser; hidden unless pumpdown is enabled; applies only to water-cooled systems.

S21B Loss of Flow CFC Threshold—Sets the threshold for CFC loss of flow.

Figure 132 Set alarms screen, page 2 of 10


SET ALARMS 2/10
◂UNIT 01▸
S212 PASSWORD (Actual Level 2) ????
S213 SUP Sensor Alarms/ Init Delay Enabled/ 90sec
S214 High / Low Supply Temperature 75°F / 50°F
S215 Dew Point Alarms/ Init Delay Disabled/ 90sec
S216 High / Low Dew Point 59°F / 39°F
S217 Dew Point A Alarms/ Init Delay Disabled/ 90sec
S218 High / Low Dew Point Sensor A 62°F / 36°F
S219 REM Sensor Alarms/ Init Delay Sep Set/ 180sec
S220 High / Low Remote Temperature 90°F / 55°F
S221 Separate thresholds: User/Set Alarms page 3
S222 EEV Alarmboard N.C.
S22A Operation on Sensor Failure Full Cooling
S22B

S213 SUP Sensor Alarms/Init Delay—The parameter to the left enables or disables the supply sensor alarms. If the unit is not equipped with a supply temperature sensor, then this parameter will show **Disabled**. The parameter to the right sets the alarm activation delay for when a supply alarm will become active after either the high or low threshold has been exceeded.

S214 High/Low Supply Temperature—Sets the high and low supply temperature threshold that will trigger a **High/Low Supply Temperature** alarm.

S215 Dew Point Alarms/ Init Delay—The parameter to the left enables or disables the return air dew point alarms. Dew point alarms can be enabled with any humidity control type. Dew point alarms may be used with or without humidification and dehumidification options selected. The parameter to the right sets the alarm activation delay for when a dew point alarm will become active after either the high or low threshold has been exceeded.

S216 High/Low Dew Point—Sets the high and low dew point threshold that will trigger a **High/Low Dew Point** alarm.

S217 Dew Point A Alarms/Init Delay—The parameter to the left enables or disables the optional Sensor A dew point alarms. Dew point alarms can be enabled with any humidity control type. Dew point alarms may be used with or without humidification and dehumidification options selected. The parameter to the right sets the alarm activation delay for when a dew point alarm will become active after either the high or low threshold has been exceeded.

S218 High/Low Dew Point Sensor A—Sets the high and low dew point alarm thresholds for Sensor A.

S219 REM Sensor Alarms/ Init Delay—Three selectable options are available for the parameter displayed on the left: **Disabled, Com Set** and **Sep Set**. Disabled prevents remote temperature sensor alarms from occurring. Com Set or common setting, allows remote alarm activation based on a common alarm setting located on line S220. Sep Set, or Separate Setting, allows the user to program unique temperature alarm settings. These setting are located in the User Menu> Set Alarms, page 3. The parameter to the far right (Init Delay) is the alarm activation delay for both Com Set and Sep Set. The default setting is 180 seconds with an adjustable range of 0-9999 seconds.

S220 High/Low Remote Temperature—The high and low temperature limits can be set here when the remote sensors all share common high and low temperature thresholds.

S221 Separate thresholds: User/Set Alarms—Read-only informational parameter that is hidden when S219 Rem Sensor Alarms are set for Com Set. When S219 is programmed for Sep Set, the S221 is visible. This indicates separate remote sensor alarm thresholds may be set in User Menus> Set Alarms, page 3

S222 EEV Alarmboard—Sets the EEV Alarmboard events sent to the board as a normally open or normally closed set of contacts. This parameter is selectable in NO or NC. The factory default is NC.

S22A Operation on Sensor Failure—Sets the operating characteristic when a sensor fails. Options for this parameter are Full Cooling and Shut Down. The factory default is Full Cooling.

Figure 133 Set alarms screen, page 3 of 10

SET ALARMS 3/10
UNIT 01
S222 PASSWORD (Actual Level 2) ????
S224 Customer Input 1 Water Alarm
S225 Customer Input 1 active when Closed
S226 Customer Input 2 Smoke
S227 Customer Input 2 active when Closed
S228 Customer Input 3 Flow Alarm
S229 Customer Input 3 active when Closed
S230 Customer Input 4 Stdby Unit
S231 Customer Input 4 active when Closed
S232 Warning Activates Alarm Relay Yes
S233 Water Alarm Shuts Unit Down No
for next/previous unit ↵ to select parameter
↵ then to change parameter ↵ to confirm

S224 Customer Input 1, 2, 3 & 4—Select the device and operation of the customer inputs. Each event reflects a different alarm and possible action to the unit. Refer to **Table 9** for a description of selectable options.

S225-231 Customer Input 1, 2, 3 & 4 active when—Select whether the input is a normally closed or normally closed input.

S232 Warning Activates Alarm Relay—Sets the alarm relay (K3) to activate when a warning occurs.

S233 Water Alarm Shuts Unit Down—Turn the unit Off if a water alarm occurs.

Set Alarm Screens, Pages 4-10

The Set Alarm Screens, pages 4 through 10 (**Figures 134** through **140**) permit setting the operation of an active alarm. Each event can be enabled or disabled and can be set to operate as an alarm, warning or message. The delay is the time the control waits before reporting the event.

Alarm: Annunciates the buzzer, triggers a monitoring event, triggers the alarm relay and flashes the red LED on the display.

Warning: Annunciates the buzzer, triggers a monitoring event, shows the event in the event viewer / front display and flashes the red LED on the display.

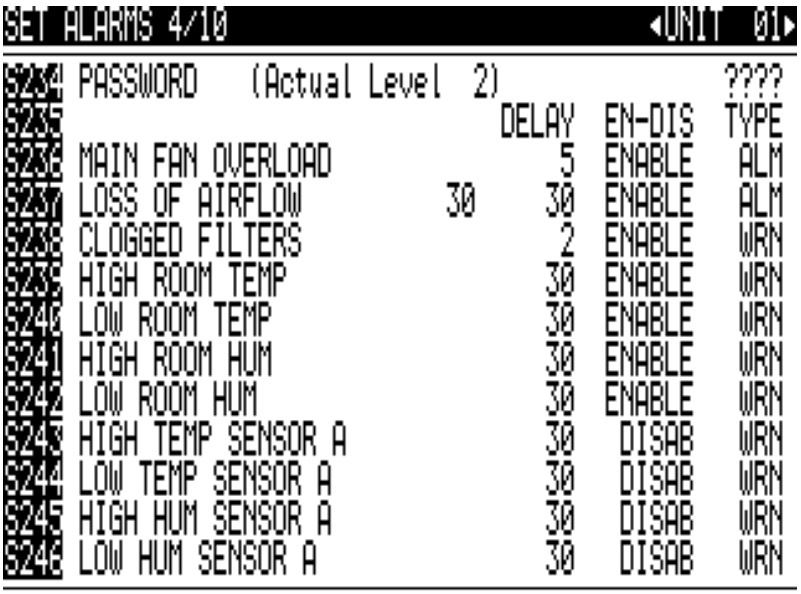
Message: Shows the event in the event viewer and on the front display.

Delay—The delay selection for each alarm.

EN-DIS—The enable / disable selection for each alarm provides the ability to individually select the alarms that will or will not activate when the alarm condition occurs.

Type—Sets the type of action for each event listed. There are three different types of events: Alarm, Warning and Message. When an event is triggered and the type is set to “Alarm,” then the light and buzzer on the display will activate, an event will be written to the event log and the (K3) alarm relay will close. If the type is set to “Warning,” then the light and buzzer on the display will activate, an event will be written to the event log and the (K3) alarm relay can be configured to close or provide no reaction. If the type is set to “Message,” then the event is only written to the event log.

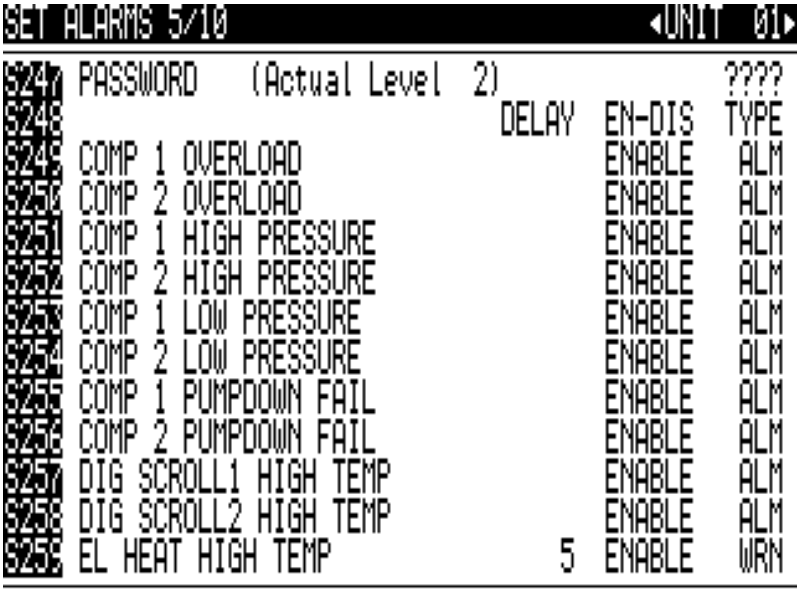
Figure 134 Set alarms screen, page 4 of 10



SET ALARMS 4/10 ◂UNIT 01▸

S236	PASSWORD (Actual Level 2)				????
S235			DELAY	EN-DIS	TYPE
S236	MAIN FAN OVERLOAD		5	ENABLE	ALM
S237	LOSS OF AIRFLOW	30	30	ENABLE	ALM
S238	CLOGGED FILTERS		2	ENABLE	WRN
S239	HIGH ROOM TEMP		30	ENABLE	WRN
S240	LOW ROOM TEMP		30	ENABLE	WRN
S241	HIGH ROOM HUM		30	ENABLE	WRN
S242	LOW ROOM HUM		30	ENABLE	WRN
S243	HIGH TEMP SENSOR A		30	DISAB	WRN
S244	LOW TEMP SENSOR A		30	DISAB	WRN
S245	HIGH HUM SENSOR A		30	DISAB	WRN
S246	LOW HUM SENSOR A		30	DISAB	WRN

Figure 135 Set alarms screen, page 5 of 10



SET ALARMS 5/10 ◂UNIT 01▸

S247	PASSWORD (Actual Level 2)				????
S248			DELAY	EN-DIS	TYPE
S249	COMP 1 OVERLOAD			ENABLE	ALM
S250	COMP 2 OVERLOAD			ENABLE	ALM
S251	COMP 1 HIGH PRESSURE			ENABLE	ALM
S252	COMP 2 HIGH PRESSURE			ENABLE	ALM
S253	COMP 1 LOW PRESSURE			ENABLE	ALM
S254	COMP 2 LOW PRESSURE			ENABLE	ALM
S255	COMP 1 PUMPDOWN FAIL			ENABLE	ALM
S256	COMP 2 PUMPDOWN FAIL			ENABLE	ALM
S257	DIG SCROLL1 HIGH TEMP			ENABLE	ALM
S258	DIG SCROLL2 HIGH TEMP			ENABLE	ALM
S259	EL HEAT HIGH TEMP		5	ENABLE	WRN

Figure 136 Set alarms screen, page 6 of 10

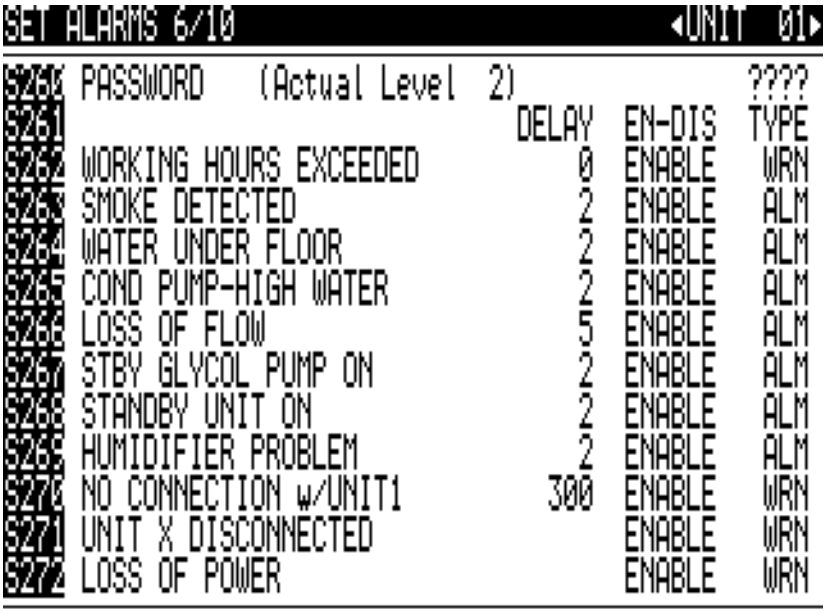

SET ALARMS 6/10
◂UNIT 01▸
PASSWORD (Actual Level 2) ????
DELAY EN-DIS TYPE
WORKING HOURS EXCEEDED 0 ENABLE WRN
SMOKE DETECTED 2 ENABLE ALM
WATER UNDER FLOOR 2 ENABLE ALM
COND PUMP-HIGH WATER 2 ENABLE ALM
LOSS OF FLOW 5 ENABLE ALM
STBY GLYCOL PUMP ON 2 ENABLE ALM
STANDBY UNIT ON 2 ENABLE ALM
HUMIDIFIER PROBLEM 2 ENABLE ALM
NO CONNECTION w/UNIT1 300 ENABLE WRN
UNIT X DISCONNECTED ENABLE WRN
LOSS OF POWER ENABLE WRN

Figure 137 Set alarms screen, page 7 of 10

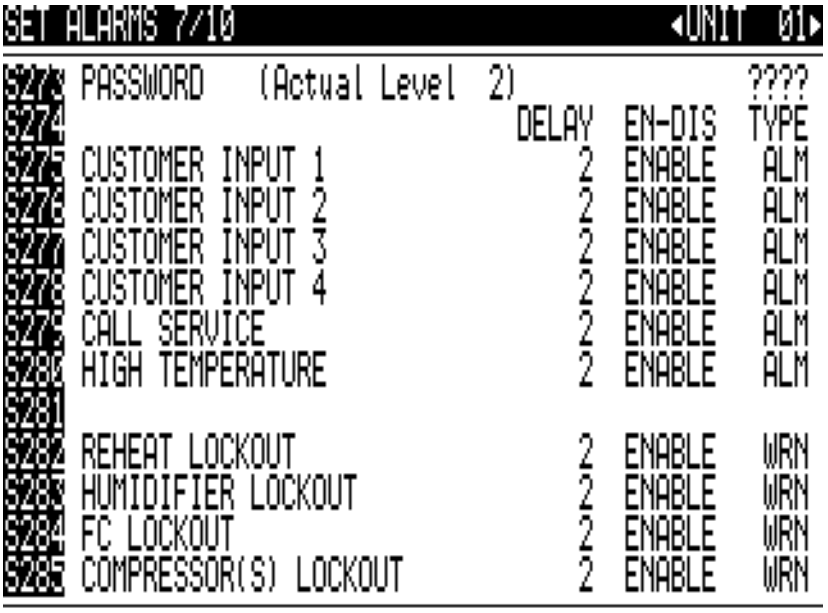

SET ALARMS 7/10
◂UNIT 01▸
PASSWORD (Actual Level 2) ????
DELAY EN-DIS TYPE
CUSTOMER INPUT 1 2 ENABLE ALM
CUSTOMER INPUT 2 2 ENABLE ALM
CUSTOMER INPUT 3 2 ENABLE ALM
CUSTOMER INPUT 4 2 ENABLE ALM
CALL SERVICE 2 ENABLE ALM
HIGH TEMPERATURE 2 ENABLE ALM
REHEAT LOCKOUT 2 ENABLE WRN
HUMIDIFIER LOCKOUT 2 ENABLE WRN
FC LOCKOUT 2 ENABLE WRN
COMPRESSOR(S) LOCKOUT 2 ENABLE WRN

Figure 138 Set alarms screen, page 8 of 10

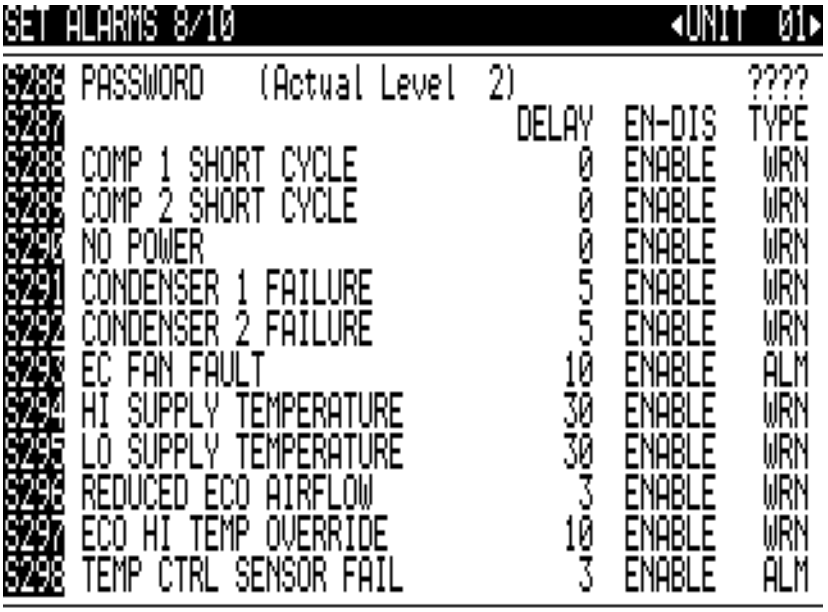

SET ALARMS 8/10
UNIT 01
PASSWORD (Actual Level 2) ????
DELAY EN-DIS TYPE
COMP 1 SHORT CYCLE 0 ENABLE WRN
COMP 2 SHORT CYCLE 0 ENABLE WRN
NO POWER 0 ENABLE WRN
CONDENSER 1 FAILURE 5 ENABLE WRN
CONDENSER 2 FAILURE 5 ENABLE WRN
EC FAN FAULT 10 ENABLE ALM
HI SUPPLY TEMPERATURE 30 ENABLE WRN
LO SUPPLY TEMPERATURE 30 ENABLE WRN
REDUCED ECO AIRFLOW 3 ENABLE WRN
ECO HI TEMP OVERRIDE 10 ENABLE WRN
TEMP CTRL SENSOR FAIL 3 ENABLE ALM

Figure 139 Set alarms screen, page 9 of 10

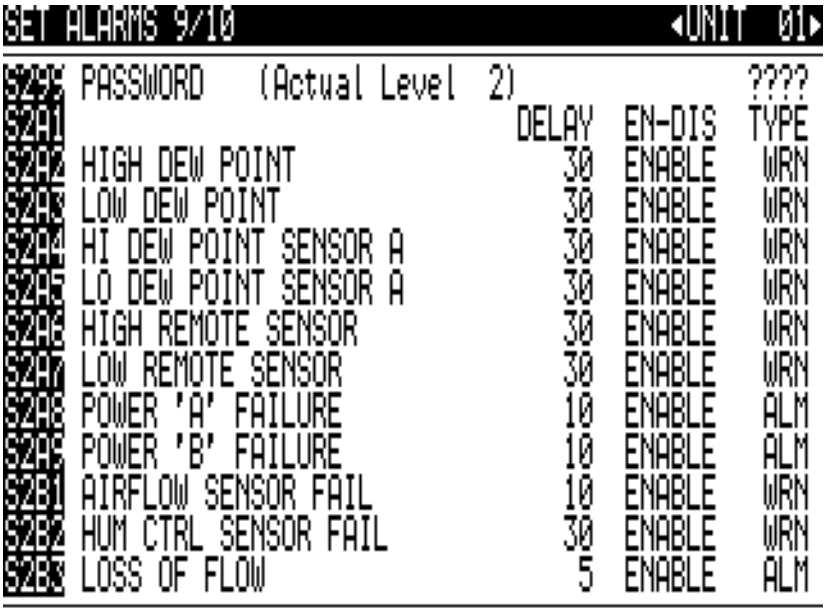
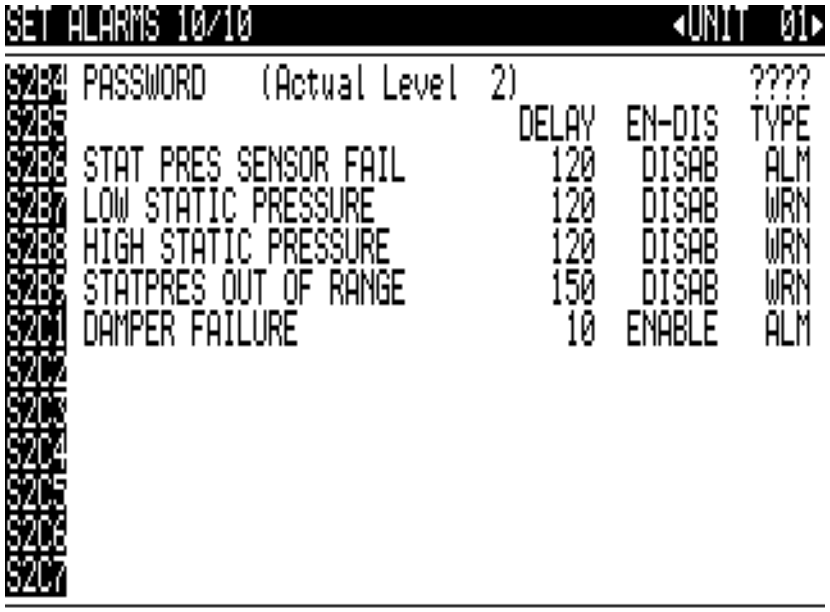

SET ALARMS 9/10
UNIT 01
PASSWORD (Actual Level 2) ????
DELAY EN-DIS TYPE
HIGH DEW POINT 30 ENABLE WRN
LOW DEW POINT 30 ENABLE WRN
HI DEW POINT SENSOR A 30 ENABLE WRN
LO DEW POINT SENSOR A 30 ENABLE WRN
HIGH REMOTE SENSOR 30 ENABLE WRN
LOW REMOTE SENSOR 30 ENABLE WRN
POWER 'A' FAILURE 10 ENABLE ALM
POWER 'B' FAILURE 10 ENABLE ALM
AIRFLOW SENSOR FAIL 10 ENABLE WRN
HUM CTRL SENSOR FAIL 30 ENABLE WRN
LOSS OF FLOW 5 ENABLE ALM

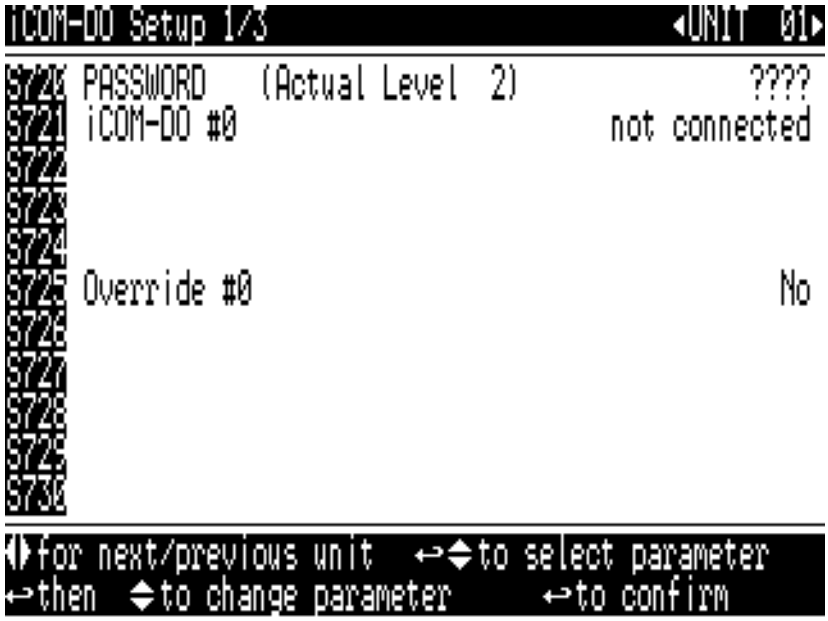
Figure 140 Set alarms screen, page 10 of 10


SET ALARMS 10/10
UNIT 01
PASSWORD (Actual Level 2) ????
DELAY EN-DIS TYPE
STAT PRES SENSOR FAIL 120 DISAB ALM
LOW STATIC PRESSURE 120 DISAB WRN
HIGH STATIC PRESSURE 120 DISAB WRN
STATPRES OUT OF RANGE 150 DISAB WRN
DAMPER FAILURE 10 ENABLE ALM

8.6 Service-iCOM-DO Setup Menu Screens

The iCOM-DO Setup menu is used to configure the Liebert iCOM-DO.

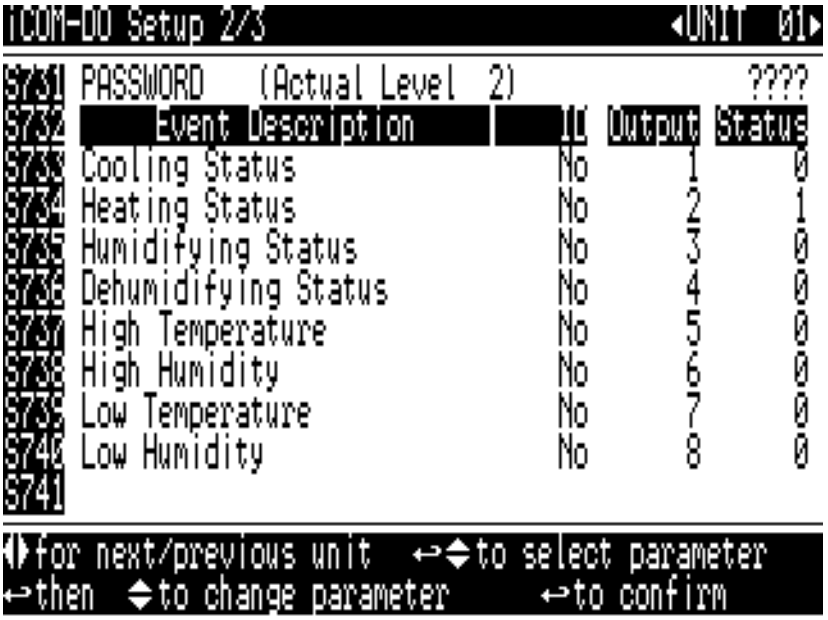
Figure 141 iCOM-DO overview and override screen, page 1 of 3


iCOM-DO Setup 1/3
UNIT 01
PASSWORD (Actual Level 2) ????
iCOM-DO #0 not connected
Override #0 No
for next/previous unit to select parameter
then to change parameter to confirm

S721 Liebert iCOM-DO™—Shows the connection status of a Liebert iCOM-DO card. It displays "connected" when a Liebert iCOM-DO card has been set up and connected to the Liebert iCOM via the CAN bus.

S725 Override—Permits manual testing the Liebert iCOM-DO by activating each output on the following screen.

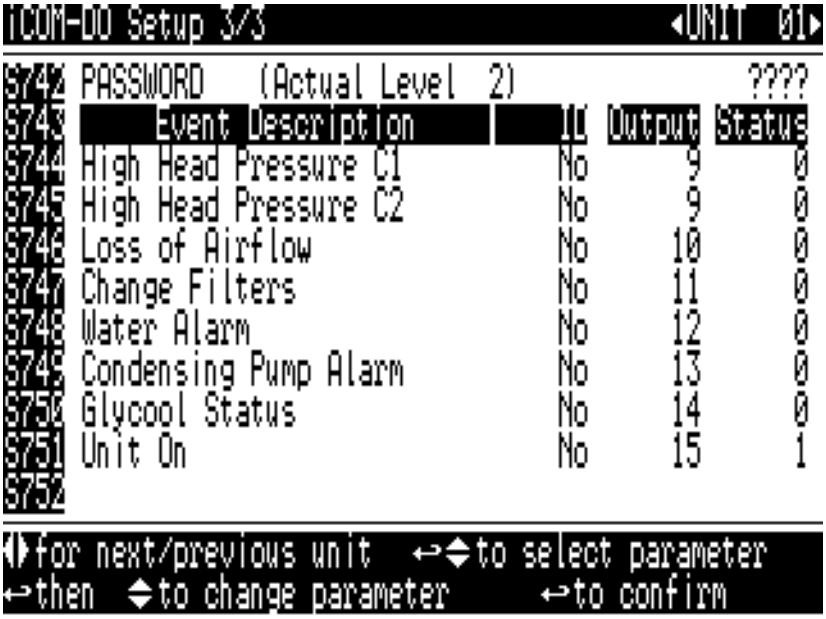
Figure 142 iCOM-DO events setup screen, page 2 of 3



S733-740, S744-S751—The lines are divided into four columns.

- **Event Description**—Read-only parameter that describes the event type that may activate an output on the Liebert iCOM-DO™. Each event description may reflect a status or alarm, depending on the line.
- **ID**—Displays the number of the Liebert iCOM-DO. Currently only one Liebert iCOM-DO card is supported. The ID must match the S721 to function.
- **Output #**—Shows which output is tied to a particular alarm. The default values are set to be the same output as the Liebert ENV-DO™ card, the predecessor to the Liebert iCOM-DO. The ID's are linked to S725.
- **Status**—Read-only value that shows the state of the output.

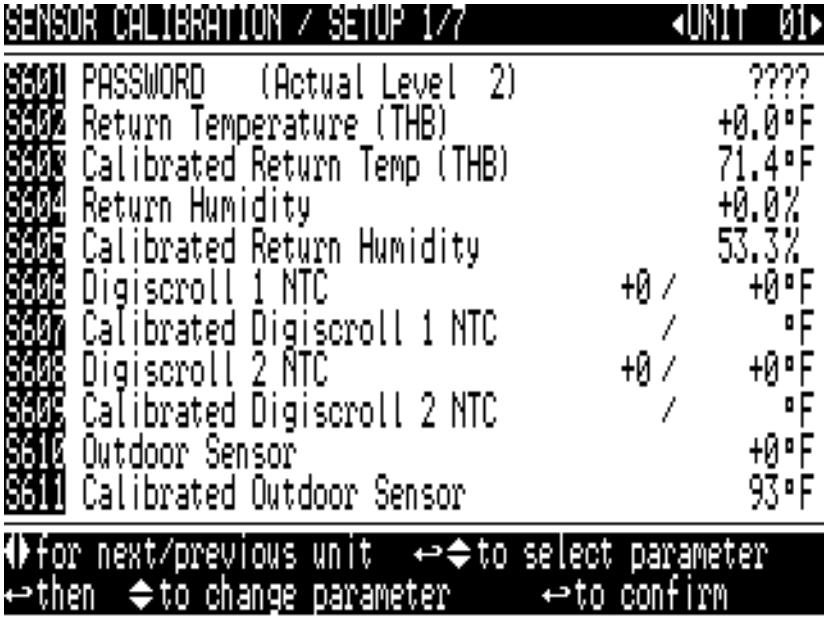
Figure 143 Liebert iCOM-DO events setup screen, page 3 of 3



8.7 Service-Sensor Calibration Menu Screens

Sensor Calibration allows the user to view readings of connected sensors and calibrate values as needed.

Figure 144 Sensor calibration setup screen, page 1 of 7


SENSOR CALIBRATION / SETUP 1/7 ◂UNIT 01▸
S601 PASSWORD (Actual Level 2) ????
S602 Return Temperature (THB) +0.0°F
S603 Calibrated Return Temp (THB) 71.4°F
S604 Return Humidity +0.0%
S605 Calibrated Return Humidity 53.3%
S606 Digiscroll 1 NTC +0 / +0°F
S607 Calibrated Digiscroll 1 NTC / °F
S608 Digiscroll 2 NTC +0 / +0°F
S609 Calibrated Digiscroll 2 NTC / °F
S610 Outdoor Sensor +0°F
S611 Calibrated Outdoor Sensor 93°F
◂▸for next/previous unit ↩⬍to select parameter
↩then ⬍to change parameter ↩to confirm

S602 Return Temperature—Adjusts the return temperature reading from the actual sensor to compensate for any error of the sensor or to match other sensors in the room.

S603 Calibrated Return Temperature—Shows the adjusted temperature value of the return sensor. This value is the actual sensor reading (+ or -) the offset “Return Temperature”.

S604 Return Humidity—Adjusts the return humidity reading from the actual sensor to compensate for any error of the sensor or to match other sensors in the room.

S605 Calibrated Return Humidity—Shows the adjusted humidity value of the return sensor. This value is the actual sensor reading (+ or -) the offset “Return Humidity”.

S606 DigiScroll 1 NTC—Adjusts the digital scroll 1 NTC reading from the actual sensor to compensate for any error or drift of the sensor.

S607 Calibrated Digiscroll 1 NTC—Shows the adjusted Digital Scroll 1 NTC sensor value. This value is the actual sensor reading (+ or -) the offset “Digital Scroll 1 NTC”.

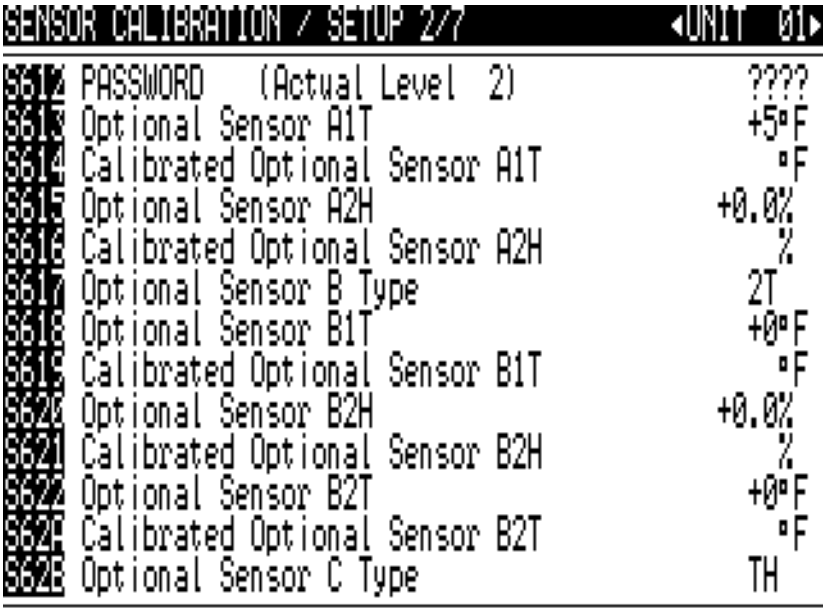
S608 Digiscroll 2 NTC—Adjusts the digital scroll 1 NTC reading from the actual sensor to compensate for any error or drift of the sensor.

S609 Calibrated Digiscroll 2 NTC—Shows the adjusted Digital Scroll 1 NTC sensor value. This value is the actual sensor reading (+ or -) the offset “Digital Scroll 1 NTC.”

S610 Outdoor Sensor—Adjusts the outdoor temperature reading from the actual sensor to compensate for any error of the sensor or to match other sensors in the room.

S611 Calibrated Outdoor Sensor—Shows the adjusted temperature value of the outdoor sensor. This value is the actual sensor reading (+ or -) the offset “Outdoor Sensor.”

Figure 145 Sensor calibration/setup screen, page 2 of 7

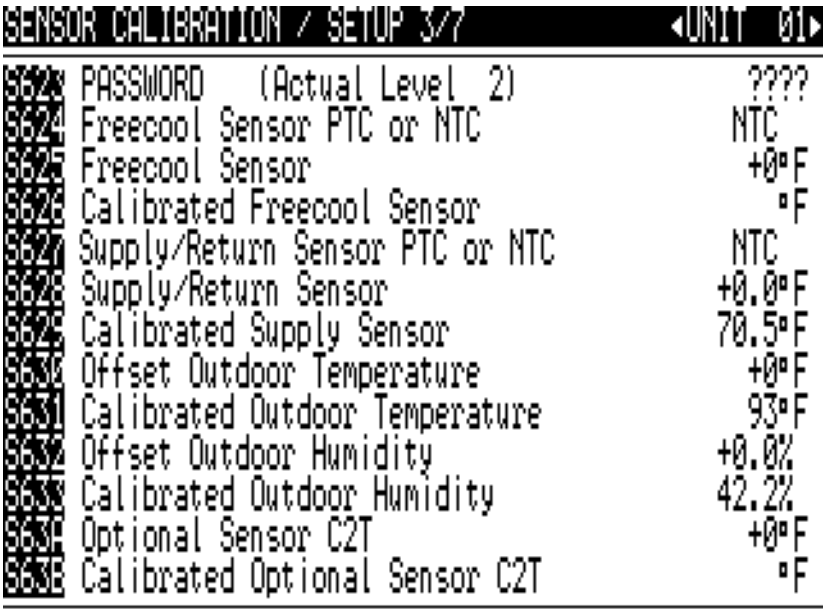

SENSOR CALIBRATION / SETUP 2/7
UNIT 01
PASSWORD (Actual Level 2) ????
Optional Sensor A1T +5°F
Calibrated Optional Sensor A1T °F
Optional Sensor A2H +0.0%
Calibrated Optional Sensor A2H %
Optional Sensor B Type 2T
Optional Sensor B1T +0°F
Calibrated Optional Sensor B1T °F
Optional Sensor B2H +0.0%
Calibrated Optional Sensor B2H %
Optional Sensor B2T +0°F
Calibrated Optional Sensor B2T °F
Optional Sensor C Type TH

Optional Sensor A and B—Adjusts the reading from the actual sensor to compensate for any error of the sensor or to match other sensors in the room.

Calibrated Optional Sensor A and B—Shows the adjusted value of the sensor. This value is the actual sensor reading (+ or -) the offset.

Optional Sensor C Type—Currently supports only the “TH” Temperature/Humidity sensor type.

Figure 146 Sensor calibration/setup screen, page 3 of 7


SENSOR CALIBRATION / SETUP 3/7
◂UNIT 01▸
S622 PASSWORD (Actual Level 2) ????
S624 Freecool Sensor PTC or NTC NTC
S625 Freecool Sensor +0°F
S626 Calibrated Freecool Sensor °F
S627 Supply/Return Sensor PTC or NTC NTC
S628 Supply/Return Sensor +0.0°F
S629 Calibrated Supply Sensor 70.5°F
S630 Offset Outdoor Temperature +0°F
S631 Calibrated Outdoor Temperature 93°F
S632 Offset Outdoor Humidity +0.0%
S633 Calibrated Outdoor Humidity 42.2%
S63A Optional Sensor C2T +0°F
S63B Calibrated Optional Sensor C2T °F

S624 Freecool Sensor PTC or NTC—Currently supports only the NTC selection.

S625 Freecool Sensor—Adjusts the free-cooling temperature reading from the actual sensor to compensate for any sensor error or to match other sensors in the room.

S626 Calibrated Freecool Sensor—Shows the adjusted temperature value of the free-cooling sensor. This value is the actual sensor reading (+ or -) the offset “Freecool Sensor.”

S627 Supply/Return Sensor PTC or NTC—Supports only the NTC selection.

S628 Supply/Return Sensor—Adjusts the supply temperature reading from the actual sensor to compensate for any sensor error or to match other sensors in the room.

S629 Calibrated Supply Sensor—Shows the adjusted temperature value of the supply sensor. This value is the actual sensor reading (+ or -) the offset “Supply Sensor”.

S630 Offset Outdoor Temperature—Adjusts the outdoor temperature reading from the actual sensor reading to compensate for any sensor error or to match other sensors.

S631 Calibrated Outdoor Temperature—Shows the adjusted temperature value of the outdoor temperature. This value is the actual sensor reading (+ or -) the “Offset Outdoor Temperature”.

S632 Offset Outdoor Humidity—Adjusts the outdoor humidity reading from the actual sensor reading to compensate for any sensor error or to match other sensors.

S633 Calibrated Outdoor Humidity—Shows the adjusted humidity value of the outdoor humidity sensor. This value is the actual sensor reading (+ or -) the “Offset Outdoor Humidity”.

S63A Optional Sensor C2T—Shows the adjusted temperature value of the sensor C. This value is the actual sensor reading (+ or -) the “Calibrated Optional Sensor C2T”.

S63B Calibrated Optional Sensor C2T—Adjusts the optional sensor C2T reading from the actual sensor reading to compensate for any sensor error or to match other sensors.

Figure 147 Sensor calibration/setup screen, page 4 of 7

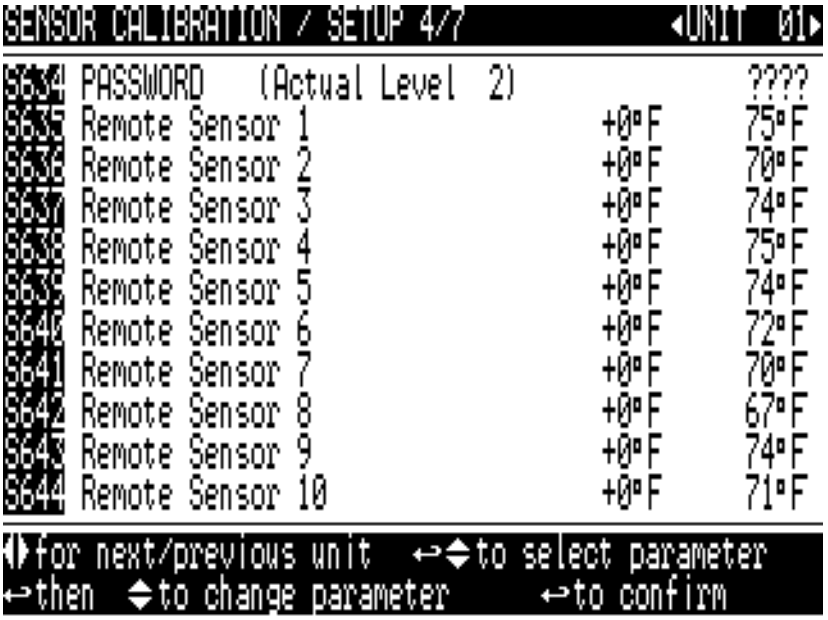

SENSOR CALIBRATION / SETUP 4/7
UNIT 01
PASSWORD (Actual Level 2) ????
Remote Sensor 1 +0°F 75°F
Remote Sensor 2 +0°F 70°F
Remote Sensor 3 +0°F 74°F
Remote Sensor 4 +0°F 75°F
Remote Sensor 5 +0°F 74°F
Remote Sensor 6 +0°F 72°F
Remote Sensor 7 +0°F 70°F
Remote Sensor 8 +0°F 67°F
Remote Sensor 9 +0°F 74°F
Remote Sensor 10 +0°F 71°F
for next/previous unit ↩ to select parameter
↩then to change parameter ↩to confirm

Figure 148 Sensor calibration/setup screen, page 5 of 7

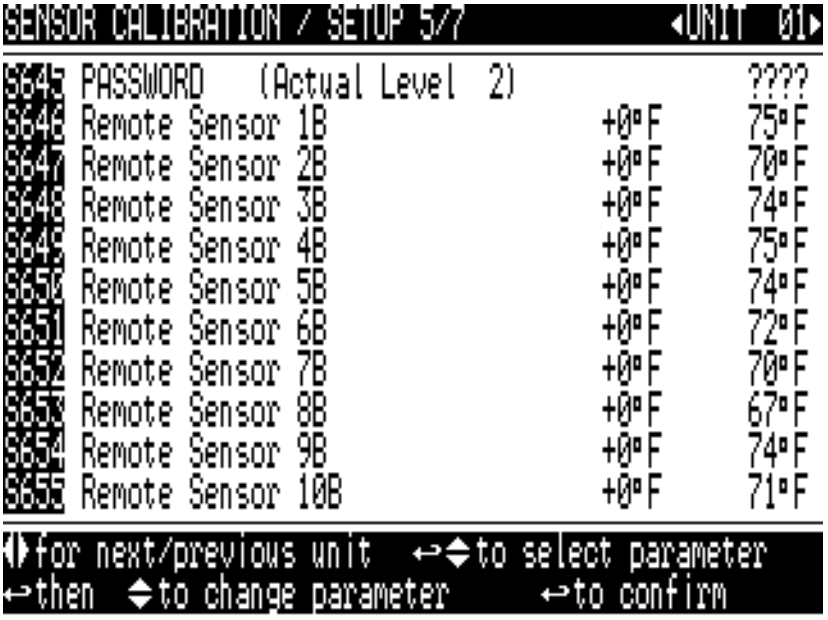
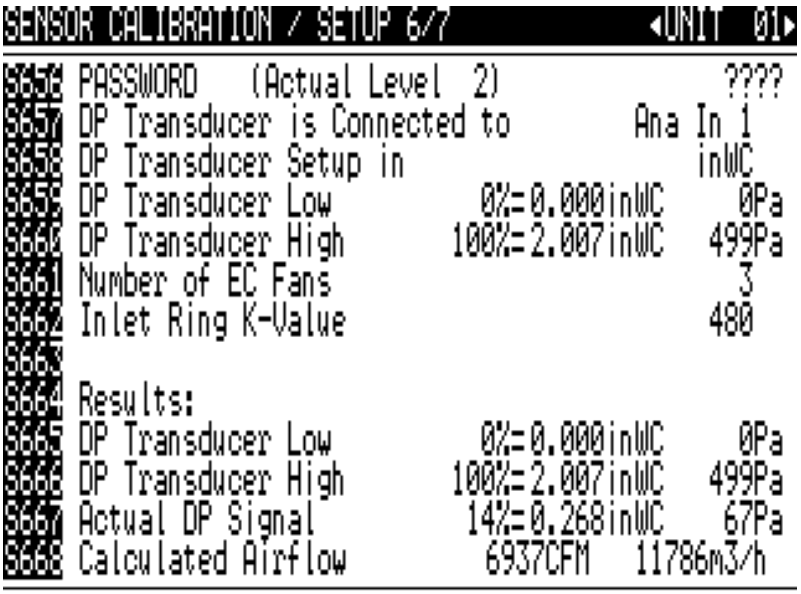

SENSOR CALIBRATION / SETUP 5/7
UNIT 01
PASSWORD (Actual Level 2) ????
Remote Sensor 1B +0°F 75°F
Remote Sensor 2B +0°F 70°F
Remote Sensor 3B +0°F 74°F
Remote Sensor 4B +0°F 75°F
Remote Sensor 5B +0°F 74°F
Remote Sensor 6B +0°F 72°F
Remote Sensor 7B +0°F 70°F
Remote Sensor 8B +0°F 67°F
Remote Sensor 9B +0°F 74°F
Remote Sensor 10B +0°F 71°F
for next/previous unit ↩ to select parameter
↩then to change parameter ↩to confirm

Figure 149 Sensor calibration/setup screen, page 6 of 7


SENSOR CALIBRATION / SETUP 6/7 ◂UNIT 01▸
S656 PASSWORD (Actual Level 2) ????
S657 DP Transducer is Connected to Ana In 1
S658 DP Transducer Setup in inWC
S659 DP Transducer Low 0%=0.000inWC 0Pa
S660 DP Transducer High 100%=2.007inWC 499Pa
S661 Number of EC Fans 3
S662 Inlet Ring K-Value 480
S663
S664 Results:
S665 DP Transducer Low 0%=0.000inWC 0Pa
S666 DP Transducer High 100%=2.007inWC 499Pa
S667 Actual DP Signal 14%=0.268inWC 67Pa
S668 Calculated Airflow 6937CFM 11786m3/h

S657 DP Transducer is Connected to—Sets the analog output that will be used for the differential pressure transducer. This parameter is selectable from None, Ana In 1, Ana In 2, Ana In 3 and Ana In 4. The factory default is none.

S658 DP Transducer is Setup in—Sets the unit of measure that will be used for the differential pressure transducer. This parameter is selectable in inWC or PA. The factory default is PA.

S659 DP Transducer Low—Sets the unit of measure that will be used for the low differential pressure transducer. This parameter is selectable from 0-9.999 inWC. The factory default is 0.000 inWC.

S660 DP Transducer High—Sets the unit of measure that will be used for the high differential pressure transducer. This parameter is selectable from 0-9.999 inWC. The factory default is 2.005 inWC.

S661 Number of EC Fans—Sets the unit of number of EC fans. This parameter is selectable between 1 and 5. The factory default is 3.

S662 Inlet Ring K-Value—Sets the inlet ring K-Value. This parameter is selectable between 1 and 999. The factory default is 480.

S664 Results:—Read-only string that describes S665 through S668.

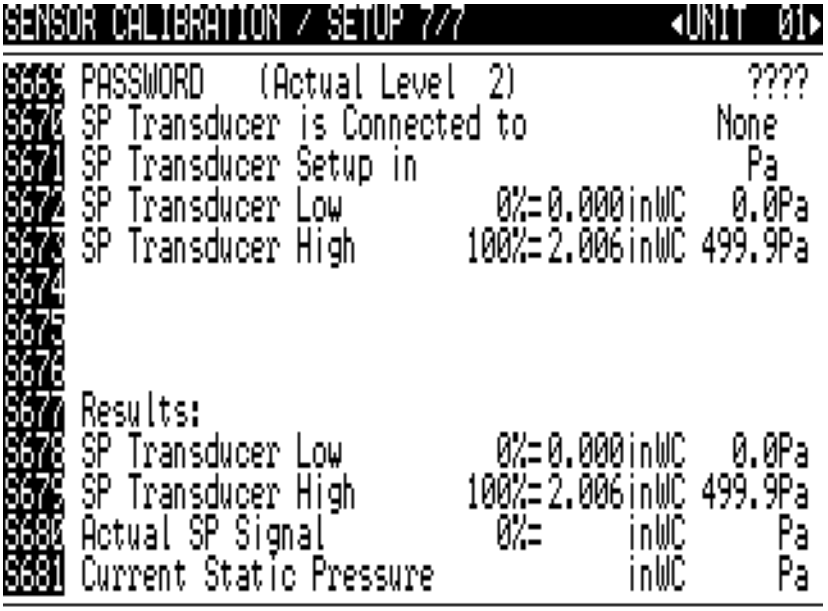
S665 DP Transducer Low—Shows the status of the low differential pressure transducer in both inWC and Pa after it's setup at S659.

S666 DP Transducer High—Shows the status of the high differential pressure transducer in both inWC and Pa after it's setup at S660.

S667 Actual DP Signal—Shows the actual differential pressure transducer percentage.

S668 Calculated Airflow—Shows the calculated airflow based on the low, high, number of EC fans and the Inlet Ring K-Value settings.

Figure 150 Sensor calibration/setup screen, page 7 of 7


SENSOR CALIBRATION / SETUP 7/7
◂UNIT 01▸
S669 PASSWORD (Actual Level 2) ????
S670 SP Transducer is Connected to None
S671 SP Transducer Setup in Pa
S672 SP Transducer Low 0%=0.000inWC 0.0Pa
S673 SP Transducer High 100%=2.006inWC 499.9Pa
S674
S675
S676
S677 Results:
S678 SP Transducer Low 0%=0.000inWC 0.0Pa
S679 SP Transducer High 100%=2.006inWC 499.9Pa
S680 Actual SP Signal 0%= inWC Pa
S681 Current Static Pressure inWC Pa

S670 SP Transducer is Connected to—Sets the analog output that will be used for the static pressure transducer. This parameter is selectable from None, Ana In 1, Ana In 2, Ana In 3 and Ana In 4. The factory default is none.

S671 SP Transducer Setup in—Sets the unit of measure that will be used for the static pressure transducer. This parameter is selectable in inWC or PA. The factory default is PA.

S672 SP Transducer Low—Sets the unit of measure that will be used for the low static pressure transducer. This parameter is selectable from 0-9.999 inWC. The factory default is 0.000 inWC.

S673 SP Transducer High—Sets the unit of measure that will be used for the high static pressure transducer. This parameter is selectable from 0-9.999 inWC. The factory default is 2.005 inWC.

S677 Results:—Read-only string that describes S678 through S681.

S678 SP Transducer Low—Shows the status of the low static pressure transducer in both inWC and Pa after it's setup at S672.

S679 SP Transducer High—Shows the status of the high static pressure transducer in both inWC and Pa after it's setup at S673.

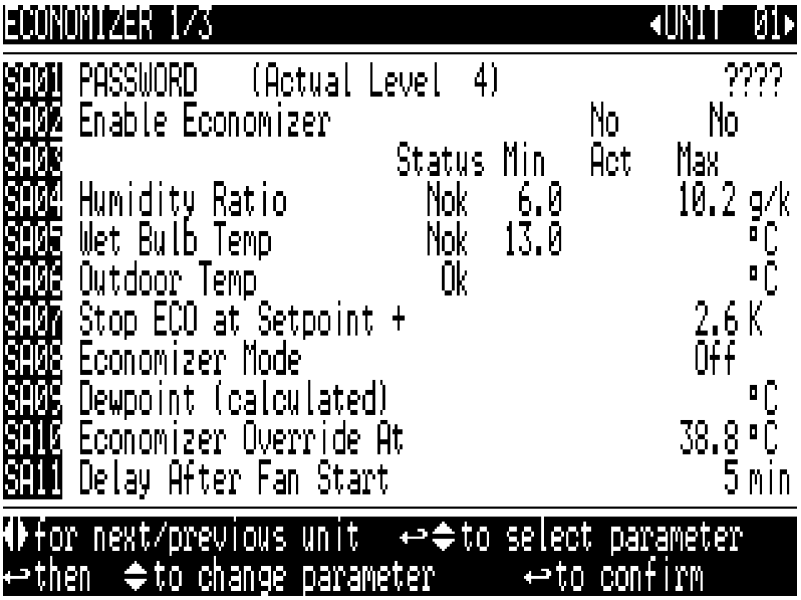
S680 Actual SP Signal—Shows the actual static pressure transducer percentage.

S681 Current Static Pressure—Shows the current static pressure based on low and high settings.

8.8 Service-Economizer Menu Screens

Economizer provides advanced air side Economizer monitoring and parameter adjustment

Figure 151 Economizer, page 1 of 3


ECONOMIZER 1/3
UNIT 01
SA01 PASSWORD (Actual Level 4) ????
SA02 Enable Economizer No No
SA03 Status Min Act Max
SA04 Humidity Ratio Nok 6.0 10.2 g/k
SA05 Wet Bulb Temp Nok 13.0 °C
SA06 Outdoor Temp Ok °C
SA07 Stop ECO at Setpoint + 2.6 K
SA08 Economizer Mode Off
SA09 Dewpoint (calculated) °C
SA10 Economizer Override At 38.8 °C
SA11 Delay After Fan Start 5 min
for next/previous unit ↵ to select parameter
↵then to change parameter ↵to confirm

SA02 Enable Economizer—Sets the Liebert Air Economizer™ operation to one of the following modes. These selections only determine if the Liebert Air Economizer is available for use; they do not determine or override damper position. Damper position is always controlled by the sensor set to control temperature (i.e., Return / Supply Sensor)

- **Yes**: This parameter will operate the Liebert Air Economizer based on the outdoor sensor reading and will allow the Liebert iCOM to determine if the conditions are within the acceptable range of operation.
- **NO**: This parameter will disable the Liebert Air Economizer and will not allow Liebert Air Economizer to operate even if the outdoor conditions are acceptable.
- **Remote**: This parameter will enable the Liebert Air Economizer and ignore the outdoor Liebert iCOM sensor even if the conditions are outside the range of operation.

SA04 Humidity Ratio—Sets the minimum and maximum limits of outdoor air based on the amount of moisture content. The humidity ratio is set based on pounds of moisture per pound of dry air. This is equivalent to the dew point temperatures.

SA05 Wet Bulb Temp—Read-only value that displays the outdoor wet bulb temperature. (This reading will be in metric values.)

SA06 Outdoor Temp—Displays the actual outdoor temperature based on the Temperature Humidity sensor (Sensor C). When this parameter shows OK, the outdoor temperature requirements have been met to use economization. When NOK is shown, the outdoor temperature is outside the operating range set in the Liebert iCOM control.

SA07 Stop ECO at Setpoint + —Sets the temperature when the Liebert Air Economizer will be disabled due to an increasing outdoor air temperature. This parameter is added to the return air sensor setpoint and then compared to the outdoor temperature reading. If the outdoor temperature reading exceeds the return air temperature setpoint plus this parameter, the Liebert Air Economizer will be disabled. This is factory-set at 20°F (-6.7°C).

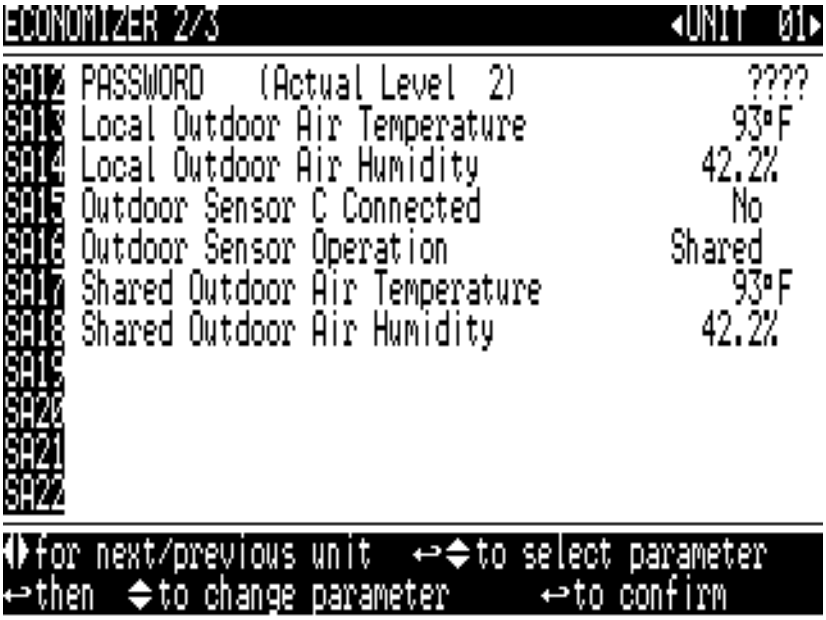
SA08 Economizer Mode—Displayed when the Liebert Air Economizer is available for use.

SA09 Dew Point (calculated)—Displays the actual outdoor dew point based on the outdoor sensor.

SA10 Economizer Override At—Sets the indoor temperature when the Liebert Air Economizer™ will be locked out. Even when all other parameters are satisfied, the Liebert Air Economizer will be locked out when the return air temperature sensor reads this value.

SA11 Delay After Fan Start—Sets the delay from the time the unit has been started until the ECO EMERGENCY OVERRIDE can be triggered. This allows airflow to pass over the sensors to get an accurate reading before any emergency modes are activated.

Figure 152 Economizer, page 2 of 3


ECONOMIZER 2/3
UNIT 01
SA12 PASSWORD (Actual Level 2) ????
SA13 Local Outdoor Air Temperature 93°F
SA14 Local Outdoor Air Humidity 42.2%
SA15 Outdoor Sensor C Connected No
SA16 Outdoor Sensor Operation Shared
SA17 Shared Outdoor Air Temperature 93°F
SA18 Shared Outdoor Air Humidity 42.2%
SA19
SA20
SA21
SA22
for next/previous unit ↩to select parameter
↩then to change parameter ↩to confirm

SA13 Local Outdoor Air Temperature—Actual outdoor temperature from the sensor connected to the unit.

SA14 Local Outdoor Air Humidity—Actual outdoor humidity from the sensor connected to the unit.

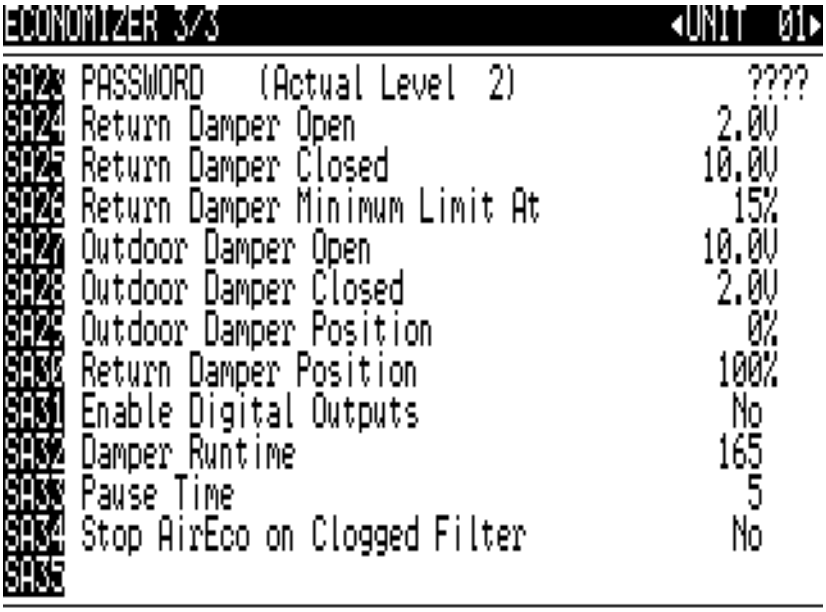
SA15 Outdoor Sensor C Connected—The default selection for units without air economizer is No. The default selection for unit with air economizer is Yes. When set to Yes, the unit uses the locally installed outdoor air temperature and humidity sensor to help determine air economizer eligibility. Setting the parameter to No on air economizer units will prevent the locally installed air economizer sensor from being used in the eligibility calculation when SA16 Outside Air Sensor is set to Shared. SA16 must be set to Shared before changing the parameter to No.

S**A16 Outdoor Sensor Operatio**n—The parameter may be set to Local or Shared. The factory default is Shared. When set to Shared, outdoor temperature and humidity readings are averaged among all connected units. The average is used to determine air economizer eligibility. When set to Local, the sensor installed at the unit determines air economizer eligibility without influence from other units connected in the group.

SA17 Shared Outdoor Air Temperature—Read-only parameter displays the shared outside air temperature when Outdoor Sensor Operation is set to Shared.

SA18 Shared Outdoor Air Humidity—Read-only parameter displays the shared outside air humidity when Outdoor Sensor Operation is set to Shared.

Figure 153 Economizer, page 3 of 3


ECONOMIZER 3/3
UNIT 01
SA23 PASSWORD (Actual Level 2) ????
SA24 Return Damper Open 2.0V
SA25 Return Damper Closed 10.0V
SA26 Return Damper Minimum Limit At 15%
SA27 Outdoor Damper Open 10.0V
SA28 Outdoor Damper Closed 2.0V
SA29 Outdoor Damper Position 0%
SA30 Return Damper Position 100%
SA31 Enable Digital Outputs No
SA32 Damper Runtime 165
SA33 Pause Time 5
SA34 Stop AirEco on Clogged Filter No
SA35

SA24 - Return Damper Open—Sets the open voltage. This parameter may be set from 0V to 10.0V. The factory default is 2.0V.

SA25 - Return Damper Closed—Sets the closed voltage. This parameter may be set from 0V to 10.0V. The factory default is 10.0V.

SA26 - Return Damper Minimum Limit At—Sets the minimum damper position limit for recirculating return air with the outdoor air. This parameter may be set from 0-100%. The factory default is 15%.

SA27 - Outdoor Damper Open—Sets the open voltage. This parameter may be set from 0.V to 10.0V. The factory default is 2.0V.

SA28 - Outdoor Damper Closed—Sets the closed voltage. This parameter may be set from 0V to 10.0V. The factory default is 10.0V.

SA29 - Outdoor Damper Position—Shows the actual outdoor damper position; read-only.

SA30 - Return Damper Position—Shows the actual return damper position; read-only.

SA31 - Enable Digital Outputs—Enables Liebert Air Economizer digital output signal. This parameter may be set to Yes or No. The factory default is No.

SA32 - Damper Runtime—Sets the runtime for a damper. This parameter may be set from 30 to 500 seconds. The factory default is 165 seconds.

SA33 - Pause Time—Sets the time for a damper to open before the fan starts. This parameter may be set from 1-120 seconds. The factory default is 5 seconds.

SA34 - Stop AirEco On Clogged Filter—Sets the control to stop using the Air Economizer when a clogged filter event is active. This parameter may be set to Yes or No. The factory default is No on non-HPM units.

8.9 Service-System/Network Setup Menu Screens

System Network Setup allows setting up a unit-to-unit (U2U) network for multiple cooling units controlled by Liebert iCOM.

Figure 154 System/network setup screen—System, page 1 of 2 (large display only)

SYSTEM / NETWORK SETUP 1/2
SYSTEM
S801 PASSWORD (Actual Level 2) ????
S802 Number of Connected Units 2 2
S803 Teamwork Mode 3 (Optimized Aisle)
S804 Teamwork is based on Maximum
S805 Qty Units Included in Average 32
S806
S807
S808 Lock for Upgrade None No
S809 Configuration Safe OK No
S810 Network Safe OK No
S811 SW Version PA 2.01.29.04R
for next/previous unit ↩to select parameter
↩then to change parameter ↩to confirm

S802 Number of Connected Units—Reflects the number of units connected that to the Liebert iCOM large display. If multiple units are connected in a unit-to-unit network, then the number will be greater than one.

S803 Teamwork Mode—Selects which teamwork mode to use within a selected group. Teamwork modes are described in **4.0 - Teamwork**.

S804 Teamwork is based on—Choices are Average or Maximum

Average: The temperature/humidity is controlled to an average reading of the controlling sensors.

Maximum: The temperature/humidity is controlled to the highest controlling sensor reading.

S805 Qty Units Included in Average—Defines the number of units to include in the average calculation. If the Qty setting is higher than the number of units, use all teamworked units in the group for the calculation. Available only if Teamwork Mode Based On is set to Average.

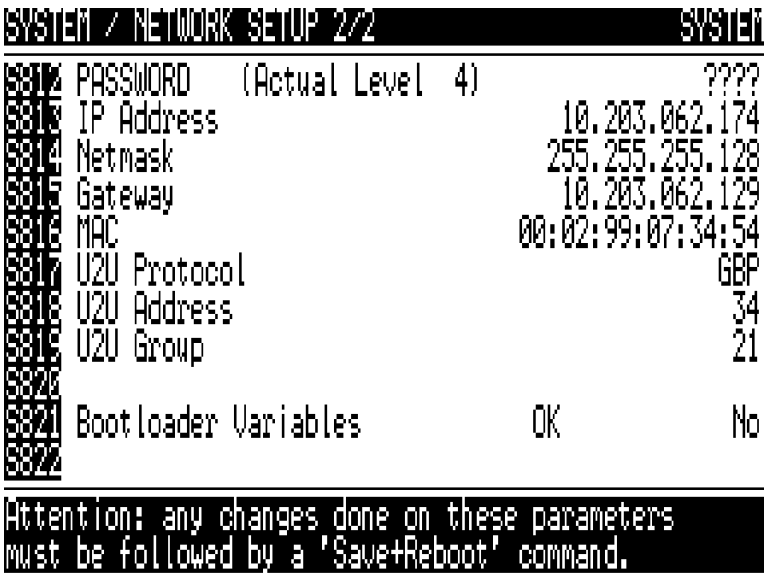
S808 Lock for Upgrade—Used to save and update files for Liebert iCOM service tool updates. Service tool updates are performed by specially trained and certified HVAC technicians.

S809 Configuration Safe—Saves or loads configuration settings for the display that have been modified from the factory defaults to an internal file that can be downloaded / uploaded using the Liebert iCOM Service Tool. Selecting “Save” will write the settings to the internal storage file and selecting “Load” will write the settings from the internal storage file to the application software. The internal file is updated every 12 hours automatically.

S810 Network Safe—Saves or loads network settings for the display that have been modified from the factory defaults to an internal file that can be downloaded/uploaded using the Liebert iCOM Service Tool. Selecting “Save” will write the settings to the internal storage file. Selecting “Load” will write the settings from the internal storage file to the application software.

S811 SW Version—Contains the application software version loaded onto the Liebert iCOM display.

Figure 155 System/network setup screen—System, page 2 of 2 (large display only)



S813 IP Address—Contains the network address of the display. This address must be unique on the network.

S814 Netmask— Netmask is used to divide IP addresses in subnet and specify the network available to hosts.

S815 Gateway—Routes data and act as a proxy server or a fire wall when setting up networks.

S816 MAC—Unique hardware identifier of the Ethernet device. READ ONLY

S817 U2U Protocol—Always set to GBP.

S818 U2U Address—Unique identifier for each unit on the network. Display addresses range from 33 to 64. Each display on the U2U network must have a different U2U address.

S819 U2U Group—Used to create zones or groups within a U2U network. Once a group number is selected the display will see only devices with the same group number. The group number can be changed to view other devices in different groups.

S821 Bootloader Variables—Indicates if there has been a change to the bootloader since it was last loaded, such as monitoring protocol, IP subnet setting, group or U2U number. This parameter should only be activated by an authorized service person.

8.10 Service-System/Network Unit-Level Setup Menu Screens

Figure 156 System/network setup screen—Unit, page 1 of 2

SYSTEM / NETWORK SETUP 1/2
◂UNIT 01▸
S824 PASSWORD (Actual Level 0) ????
S824 Monitoring Address 3
S825 Monitoring Timeout/Handshake No/ 0
S826
S827 Unit Name UNIT
S828
S829
S830 Lock for Upgrade None No
S831 Configuration Safe Changed No
S832 Network Safe OK No
S833 SW Version PA 2.01.29.04R
for next/previous unit ↩⬍to select parameter
↩then ⬍to change parameter ↩to confirm

S824 Monitoring Address—Sets the address used by the Liebert IntelliSlot® cards. This is set to 3 at the factory and should not be changed.

S825 Monitoring Timeout/Handshake—Can be used with a building management system to verify communication has not been lost between the Liebert iCOM control and the BMS. If the time specified in this parameter elapses before the BMS writes a new value, then an alarm will occur "BMS TIMEOUT" and the temperature setpoint will revert to the backup setpoint and the fan speed "if equipped" will change to 100%. To disable this feature, write a zero to this parameter when it is active.

S827 Unit Name—A six-digit label to identify the unit from the local or remote display. This label will show at the top right of every screen that has monitoring or configuration of that unit.

S830 Lock for Upgrade—Locks the Liebert iCOM functions to permit upgrading firmware.

S831 Configuration Safe—Saves or loads configuration settings for the control board that have been modified from the factory default to an internal file that can be downloaded / uploaded using the Liebert iCOM Service Tool. Selecting Save will write the settings to the internal storage file and selecting Load will write the settings from the internal storage file to the application software. The internal file is updated automatically every 12 hours.

S832 Network Safe—Saves or loads network settings for the control board that have been modified from the factory defaults to an internal file that can be downloaded / uploaded using the Liebert iCOM Service Tool. Selecting Save will write the settings to the internal storage file and selecting Load will write the settings from the internal storage file to the application software.

S833 SW Version—Contains the application software version loaded onto the Liebert iCOM control board.

Figure 157System/network setup screen—Unit, page 2 of 2

SYSTEM / NETWORK SETUP 2/2
◂UNIT 01▸
S834 PASSWORD (Actual Level 0) ????
S835 Monitoring Protocol Velocity V4
S836 IP Address 192.168.254.001
S837 Netmask 255.255.255.000
S838 Gateway 0.000.000.000
S839 MAC 00:02:99:04:DB:8D
S840 U2U Protocol GBP
S841 U2U Address 1
S842 U2U Group 1
S843 Bootloader Variables OK No
S844 Static RAM OK No
Attention: any changes done on these parameters
must be followed by a 'Save+Reboot' command.

S835 Monitoring Protocol—Selects the monitoring protocol. Velocity V4 is the factory default that will provide communication to the Liebert IntelliSlot® housing. IGMNet will activate the legacy Liebert SiteLink™ protocol for communication to the Liebert SiteLink™(-E). Liebert Hironet™ is used only on Liebert HPM™ units.

S836 IP Address—Contains the network address of the display. This address must be unique on the network.

S837 Netmask—Netmask is used to divide IP addresses in subnet and specify the network available to hosts.

S838 Gateway—Routes data and act as a proxy server or a firewall when setting up networks.

S839 MAC—Unique hardware identifier of the Ethernet device; read-only.

S840 U2U Protocol—This parameter is always set to GBP.

S841 U2U Address—Unique identifier for each unit on the network. Display addresses range from 33 to 64. Each display on the U2U network must have a different U2U address.

S842 U2U Group—Creates zones or groups within a U2U network. Once a group number is selected, the display will see only devices with the same group number. The group number can be changed to view other devices in different groups.

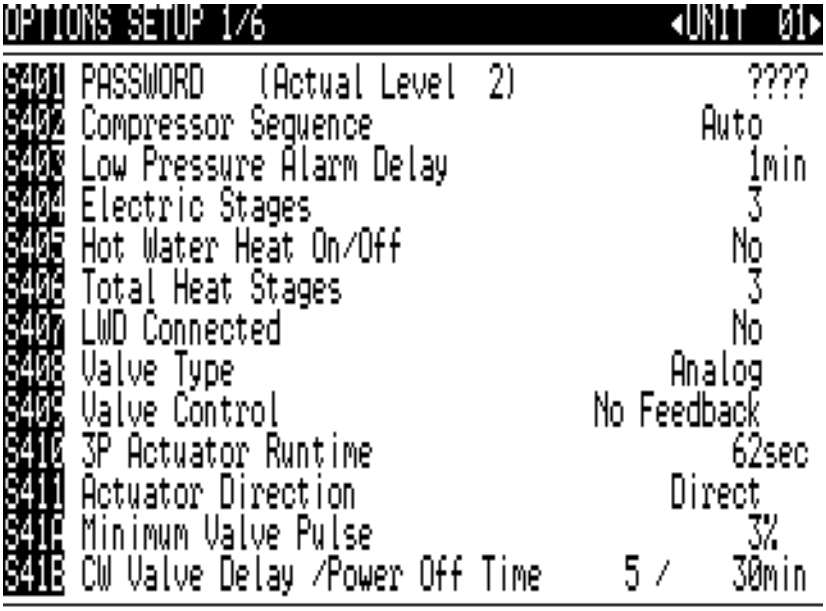
S843 Bootloader Variables—Indicates if there has been a change to the boot loader since it was last loaded. This parameter should only be activated by an authorized service person.

S844 Static RAM—Static RAM shows the status of changes made and whether they have been saved to the Static Memory on the board. The ranges of this parameter are, 0=Not Available, 1=Invalid, 2=OK, 3=Changed, 4=Updating and 5=Locked. The right hand parameter will allow the user to do two options, 0=nothing or 1=Clear+Reboot. This clears all the settings in the Static RAM.

8.11 Service-Options Setup Menu Screens

Options Setup contains component configuration, such as enable/disable humidifier, reheat, etc.

Figure 158 Options setup, page 1 of 6


OPTIONS SETUP 1/6
◂UNIT 01▸
S401 PASSWORD (Actual Level 2) ????
S402 Compressor Sequence Auto
S403 Low Pressure Alarm Delay 1min
S404 Electric Stages 3
S405 Hot Water Heat On/Off No
S406 Total Heat Stages 3
S407 LWD Connected No
S408 Valve Type Analog
S409 Valve Control No Feedback
S410 3P Actuator Runtime 62sec
S411 Actuator Direction Direct
S41F Minimum Valve Pulse 3%
S41E CW Valve Delay /Power Off Time 5 / 30min

S402 Compressor Sequence—Changes the lead compressor when cooling is activated. This parameter can also be set to "AUTO" mode, which will activate the compressor with the lowest run hours first.

S403 Low Pressure Alarm Delay—Sets how long the unit will ignore a low-pressure condition during compressor startup. This parameter has previously been referred to as a Winter Start Time. This parameter can be set between 0 to 5 minutes.

S404 Electric Stages—Shows the number of electric stages that can be activated during a call for reheat. This parameter is set at the factory based on the unit's model number.

S405 Hot Water Heat On/Off—Selectable between "Yes and No". If "Yes" is selected, the unit is equipped with a hot water heater.

S406 Total Heat Stages—Shows the number of heat stages that can be activated during a call for reheat. This parameter is set at the factory based on the unit's model number.

S407 LWD Connected—This parameter is set to "Yes" if a liquid detection device is connected to the Liebert iCOM.

S408 Valve Type—Displays the type of valve actuator installed, either chilled water or free-cooling. This parameter is factory-set and read-only.

S409 Valve Control—Selects between two different methods to keep track of valve position when a stem/3P valve is installed in the unit. This setting does not affect motorized ball valves. If "Time" is selected, then the valve position is tracked by an internal timer in the control to determine the position or opening of the valve. If "Feedback" is selected, then analog input #1 interprets the signal from the valve to determine its position. Using the "Feedback" setting requires the setup procedure in **3.2.3 - Chilled Water Control**.

S41 3P Actuator Runtime—Sets the runtime at which the actuator will run.This parameter is adjustable from 30 - 500 seconds. Factory-set by unit code and should not be changed without contacting factory.

S411 3P Actuator Direction—Selects if the valve is a "Direct" or "Reverse" acting valve. Factory-set by unit code and should not be changed without contacting factory

S41A Minimum Valve Pulse—Sets the minimum valve pulse % when a movement is requested. This parameter is adjustable from 0 - 10%. The factory default setting is 5%.

S41B CW Valve Delay / Power Off Time—Sets the delay time of the CW valve movement when power is lost. If power is lost, the valve will not move for the time entered into this parameter so the unit has time to come back online from a power loss. This parameter is adjustable from 0 - 60 minutes. The factory default setting is 5 minutes. Sets the Power Off time; if power has been lost for the time entered into this parameter, the CW delay will be ignored. This parameter is adjustable from 0 - 300 minutes. The factory default setting is 30 minutes.

Figure 159 Options setup, page 2 of 6

OPTIONS SETUP 2/6
◂UNIT 01▸
S41A PASSWORD (Actual Level 2) ????
S413 Humidification Enabled Yes
S414 Infrared Flush Rate 150%
S415 Humidifier Steam Rate 100%
S416 Humidifier Control On-Off
S417 Humidifier Bottle Flush Time 5sec
S418 Humidifier Bottle Manual Flush Off
S419 Dehum Enabled / Dehum Fan Ctrl No/ No
S420 Auto Restart Enabled Yes
S421 Single Unit Auto Restart 5sec
S422 On-Off Enabled Yes
S42A Fan Shutdown Delay Timer 0sec
S42B

S413 Humidification Enabled—Enables or disables humidification.

S414 Infrared Flush Rate—Shows the amount of makeup water supplied to an infrared humidifier as a percentage of the humidifier capacity. This value can be set from 110-500% (default is 150%). Higher flush rates reduce mineral deposit buildup in the humidifier pan.

S415 Humidifier Steam Rate (Liebert HPM™ and Liebert PeX™ only)—Reduces humidifier capacity to be a percentage of nominal humidifier capacity on units with variable capacity steam bottle humidifiers.

S416 Humidifier Control—Used for Liebert HPM and Liebert PeX units only.

S417 Humidifier Bottle Flush Time—Used for Liebert HPM and Liebert PeX units only.

S418 Humidifier Bottle Manual Flush—Used for Liebert HPM and Liebert PeX units only.

S419 Dehum Enabled/Dehum Fan Ctrl—Selects whether the compressor and / or valve will be used to dehumidify when the humidity is above setpoint.

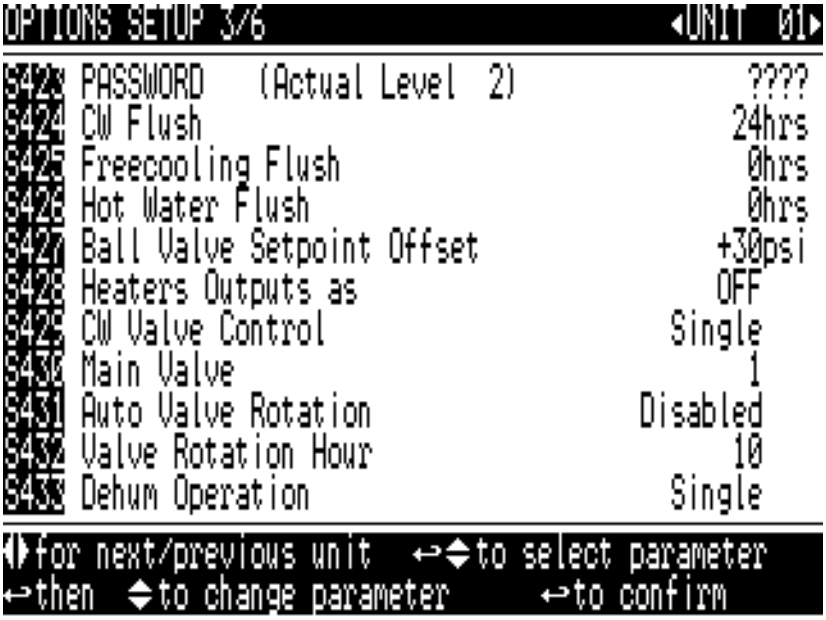
S420 Auto Restart Enabled—Restarts the unit after a power cycle when set to "Yes." When this parameter is set to "No," the unit will not restart (Turn On) after a power cycle.

S421 Single Unit Auto Restart—Sets a time delay for the unit to restart when the Auto Restart Enabled is set to "Yes". The delay begins once the boot process has completed. This parameter allows units to be staggered On to reduce the amount of simultaneous power consumption after a loss of power.

S422 On-Off Enabled—Sets the Liebert iCOM control to ignore the On/Off command from the display On/Off button when set to NO. This parameter is a local setting in the control board.

S42A Fan Shutdown Delay Timer—Sets the fan shutdown delay timer to allow the fan to continue to operate after the unit has been shut down. This parameter is adjustable from 0 - 999 seconds. The factory default setting is 0 seconds.

Figure 160 Options setup, page 3 of 6


OPTIONS SETUP 3/6
◄UNIT 01►
S423 PASSWORD (Actual Level 2) ????
S424 CW Flush 24hrs
S425 Freecooling Flush 0hrs
S426 Hot Water Flush 0hrs
S427 Ball Valve Setpoint Offset +30psi
S428 Heaters Outputs as OFF
S429 CW Valve Control Single
S430 Main Valve 1
S431 Auto Valve Rotation Disabled
S432 Valve Rotation Hour 10
S433 Dehum Operation Single
◄►for next/previous unit ↵⬍to select parameter
↵then ⬍to change parameter ↵to confirm

S424 CW Flush—Selects the number of hours between each chill water coil flush cycle. The default is every 24 hours. Reducing this number will increase the number of coil flushes.

S425 Freecooling Flush—Selects how many hours between each free-cooling coil flush cycle. The default is every 24 hours. Reducing this number will increase the number of coil flushes.

S426 Hot Water Flush—Selects how many hours between each hot water coil flush cycle. The default is every 24 hours. Reducing this number will increase the number of coil flushes.

S427 Ball Valve Setpoint Offset—Adjusts the operating compressor discharge pressure by changing the targeted range of control for units with motorized ball valves. The psi added here increases valve sensitivity. The higher the number, the more the ball valve will open at a given pressure.

S428 Heaters Outputs as (Liebert HPM™ only)—Activates the heater digital output based on the selected event on units with no heaters.

S429 CW Valve Control—Allows the valves to be set to operate in parallel, alternate or cascade for units equipped with dual motorized ball valves controlling flow to the chilled water coil. Parallel is the default selection and operates the valves at the same opening based on the call for cooling.

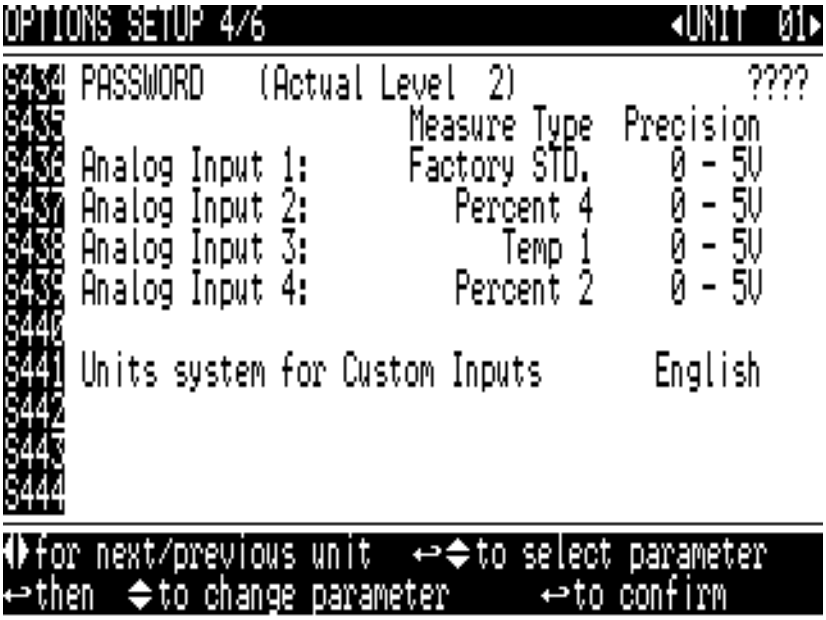
S430 Main Valve—Selects which valve is the lead valve if CW Valve Control is set for “Alternate or Cascade.”

S431 Auto Valve Rotation—Allows the valves to be rotated based on the Valve Rotation Hour if CW Valve Control is set for “Alternate or Cascade.”

S432 Valve Rotation Hour—Determines the time between the valve rotations if Auto Valve Rotation is enabled.

S433 Dehum Operation—Selects the dehumidification operation of the valves for units equipped with dual motorized ball valves controlling flow to the chilled water coil.

Figure 161 Options setup, page 4 of 6


OPTIONS SETUP 4/6
◂UNIT 01▸
S434 PASSWORD (Actual Level 2) ????
S435 Measure Type Precision
S436 Analog Input 1: Factory STD. 0 - 5V
S437 Analog Input 2: Percent 4 0 - 5V
S438 Analog Input 3: Temp 1 0 - 5V
S439 Analog Input 4: Percent 2 0 - 5V
S440
S441 Units system for Custom Inputs English
S442
S443
S444
◂▸for next/previous unit ↵⬍to select parameter
↵then ⬍to change parameter ↵to confirm

S435 Measure Type—Determines the measurement units and range for each analog input.

Factory Std measurement type means the input is being used by the factory-configured device for unit control and cannot be set to any other measurement type.

Not Config measurement type means the input is available for custom sensor use, but has not been configured. After unit code execution, all analog inputs that are available will be set to "Not Config," and can then be set to any of the following choices by the user:

- Air Pres 1, 2, 3 or 4
- Pressure 1, 2, 3 or 4
- Temp 1, 2, 3 or 4
- Percent 1, 2, 3 or 4

It is not necessary to match a measurement type number to the analog input number (i.e., "Air Pres 2" does not have to be connected to Analog Input 2). The numeric designation on each measurement type is just to allow the user to differentiate between readouts if multiple measurements of the same type are required.

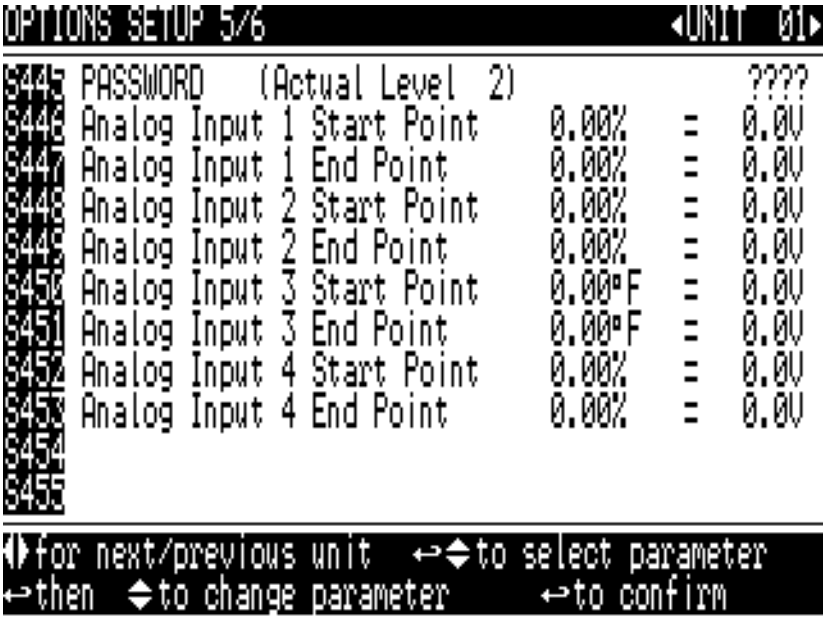
Precision—Parameters in the Precision column must match the DIP switch settings for each analog input being used. There are two choices for these parameters: 0-5V and 0-10V. This setting will also regulate the range of an analog input's linear characteristic on Page 5 of the Options Setup screen of the Service Menu (see **Figure 162**).

S441 Units system for Custom Inputs—Determines the unit type (English or SI) that will be used for the setup and readout of custom sensors. This parameter affects only analog inputs. All lines in other menus involving pressures or temperatures will have their readout type determined by line U404 of the User - Selection menu. The table below shows the English and SI units for each measurement type.

Measurement Type	Units	
	English	SI
Air Pres	inWC	Pa
Pressure	PSI	Bar
Temp	°F	°C
Percent	%	%

When the unit type is changed on line S441, the linear characteristics for all of the inputs on Page 5 of the Options Setup screen of the Service Menu will be converted to match the new units system, and the readout in the Sensor Data in the User Menu will also change to reflect the new units.

Figure 162 Options setup, page 5 of 6


OPTIONS SETUP 5/6
◀UNIT 01▶
S445 PASSWORD (Actual Level 2) ????
S446 Analog Input 1 Start Point 0.00% = 0.0V
S447 Analog Input 1 End Point 0.00% = 0.0V
S448 Analog Input 2 Start Point 0.00% = 0.0V
S449 Analog Input 2 End Point 0.00% = 0.0V
S450 Analog Input 3 Start Point 0.00°F = 0.0V
S451 Analog Input 3 End Point 0.00°F = 0.0V
S452 Analog Input 4 Start Point 0.00% = 0.0V
S453 Analog Input 4 End Point 0.00% = 0.0V
S454
S455
◀▶for next/previous unit ↵◆to select parameter
↵then ◆to change parameter ↵to confirm

Only characteristics for analog inputs used for custom sensors are visible in this menu.

Start Points (S446, S448, S450 and S452)—Represent the starting point of each analog input's linear characteristic. The column on the left indicates the desired readout at the lowest allowable sensor voltage, and the column on the right indicates the lowest sensor voltage.

End Points (S447, S449, S451 and S453—Represent the finish point of each analog input's linear characteristic. The column on the left indicates the desired readout at the highest allowable sensor voltage, and the column on the right indicates the highest sensor voltage.

The range of allowable voltages is dictated by the Precision selection for that analog output on Page 4 of the Options Setup screen of the Service Menu (see **Figure 161**). If the precision of Analog Input 1 is set to 0-5V on line S436, the voltage selection on line S447 will not be allowed to go above 5.0V.

The range of the readout start/finish points is dictated by the units system selection on line S441. The range for each is shown in the table below.

Measurement Type	Units	
	English	SI
Air Pres	-1.25 to 1.25 inWC	-320.00 to 320.00 Pa
Pressure	-320.00 to 320.00 PSI	-22.00 to 22.00 Bar
Temp	-320.00 to 320.00 °F	-160.00 to 160.00 °C
Percent	-320.00 to 320.00%	-320.00 to 320.00%

Figure 163 Options setup, page 6 of 6

OPTIONS SETUP 6/6
UNIT 01
S456 PASSWORD (Actual Level 2) ????
S457 Q15 Output Function None
S458 Q15 Output Direction Direct
S459 Fan Delay for Damper 30sec
S460 Damper Switch Feedback Timer 30sec
S461 Q15 Temp Output Sensor Return
S462 Q15 Temp Output Threshold 80°F
S463 Q15 Temp Actual 71°F
S464
S465 Medium Board: Q15 map to K11 No
S466 Q15 Output State Off
for next/previous unit ↩to select parameter
↩then to change parameter ↩to confirm

S457 Q15 Output Function—Sets the output function for Q15. This parameter is selectable for 0 = None, 1 = Dehum On, 2 = Cooling On, 3 = Reheat On, 4 = Comp On, 5 = Comp 1 On, 6 = Comp 2 On, 7 = Humi On, 8 = Fan On, 9 = FreeCool On, 10 = Damper, 11 = High Temp, 12 = Low Temp, 13 = Loss Power and 14 = Power Source The factory default setting is none. NOTE: Unit Code 16 can set the output for this parameter.

S458 Q15 output direction—Sets the Q15 output direction. This parameter is adjustable from direct or reverse. The factory default setting is direct.

S459 Fan delay for damper—Sets the delay for damper output. This parameter is adjustable from 0 = Return, 1 = Supply, 2 = Rem Max, 3 = Rem Low and 4 = Rem Avg. The factory default setting is Return. Sets the delay for the damper to open before the fan starts. This parameter is adjustable from 0 to 120 seconds.

S460 Damper switch feedback damper—Sets the timer for the damper when using Q15. This parameter is adjustable from 0 to 120 seconds. The factory default setting is 30 seconds.

S461 Q15 Temp output sensor—Sets the output sensor when using Q15. This parameter is adjustable from 0 to 120 seconds. The factory default setting is 30 seconds.

S462 Q15 Temp output threshold—Sets the output threshold for the temperature using Q15. This parameter is adjustable from 32°F to 150°F. The factory default setting is 80°F.

S463 Q15 temp actual—Shows the status of the temperature in Celsius or Fahrenheit for Q15.

S465 Medium board: Q15 map to K11—Shows the status of Q15 being mapped to K11 on the medium board. This parameter will be shown as *No* or *Yes*. On the medium board, Q15 is mapped to K11 and is selectable. If this has been selected, this parameter will show the status of K11.

S466 Q15 output state—Shows the status of the Q15 output state. This parameter will be shown as *Off* or *On*.

8.12 Service-Service Contact Info Menu Screens

Service Contact Info contains the service contact phone number, e-mail address, pager number and Web site to be entered in this screen.

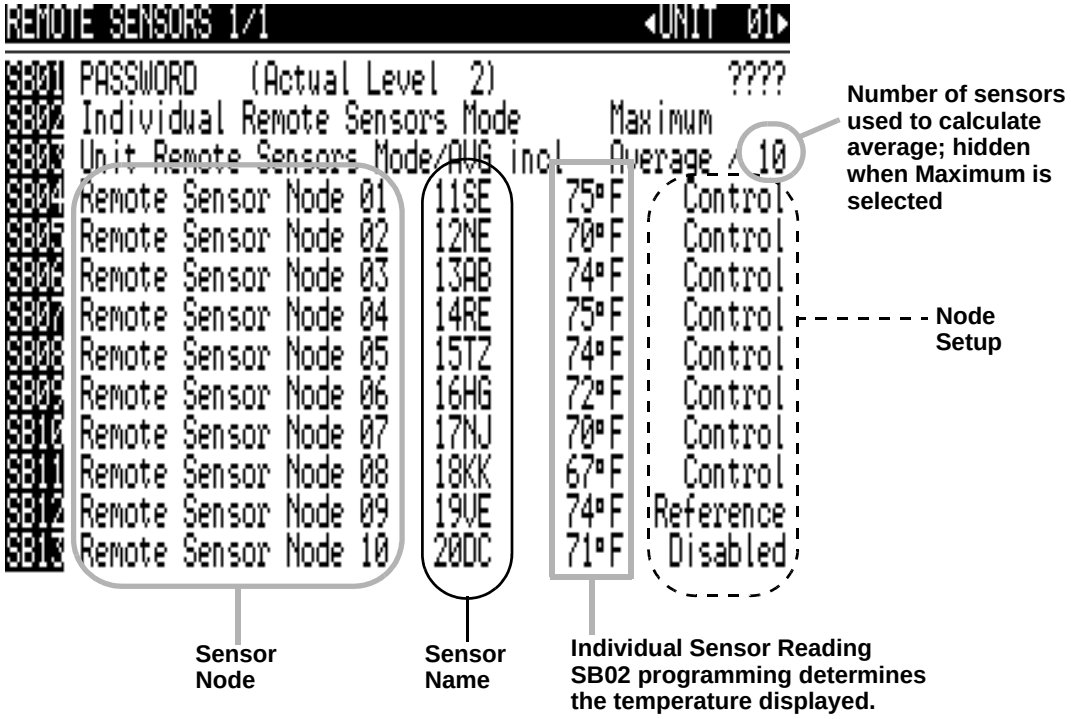
Table 21 Service contact information parameters

Function		Range Imperial (metric)
Large Display	**Small Display**	
Page 1 of 1		
Password	PASSWORD	-
Country	Country	None Austria Switzerland D Switzerland F Benelux D Benelux FL Germany France UK Hungary Italy Poland Spain United States Australia New Zealand Indonesia Malaysia Singapore
Address line 1	Address line 1	text-string
Address line 2	Address line 2	text-string
Address line 3	Address line 3	text-string
Address line 4	Address line 4	text-string

8.13 Service-Remote Sensors Menu Screens

Remote Sensors provides remote sensor setup and readings.

Figure 164 Remote sensors


REMOTE SENSORS 1/1
◂UNIT 01▸
SB01 PASSWORD (Actual Level 2) ????
SB02 Individual Remote Sensors Mode Maximum
SB03 Unit Remote Sensors Mode/AVG incl Average 10
SB04 Remote Sensor Node 01 11SE 75°F Control
SB05 Remote Sensor Node 02 12NE 70°F Control
SB06 Remote Sensor Node 03 13AB 74°F Control
SB07 Remote Sensor Node 04 14RE 75°F Control
SB08 Remote Sensor Node 05 15TZ 74°F Control
SB09 Remote Sensor Node 06 16HG 72°F Control
SB10 Remote Sensor Node 07 17NJ 70°F Control
SB11 Remote Sensor Node 08 18KK 67°F Control
SB12 Remote Sensor Node 09 19VE 74°F Reference
SB13 Remote Sensor Node 10 20DC 71°F Disabled
Number of sensors used to calculate average; hidden when Maximum is selected
Node Setup
Sensor Node
Sensor Name
Individual Sensor Reading SB02 programming determines the temperature displayed.

SB02 Individual Sensors Mode—Each sensor node has two temperature sensors connected. This line determines how each node or set of sensor readings will be displayed and used for control. Two selections are available: Maximum or Average. When set to *Maximum*, all connected sensor nodes will display the maximum reading of the of the two thermistors. When set to *Average*, all connected sensor nodes will display the average reading of the two thermistors.

SB03 Unit Remote Sensors Mode/AVG—Compares the average or maximum reading from all connected sensors depending on whether line SB02 is set to Maximum or Average. When *Average* is selected, the user may select a smaller number of sensors to be calculated in the sensor average. If the number selected is smaller than the number of sensor set for *Control*, only the highest sensor readings will be used for the average calculation.

SB04 - SB13Remote Sensor Node #—Defines the remote sensor programming and setup. Each line consists of four parts: sensor node, name, sensor reading and sensor setup.

Sensor Node—Up to 10 wired 2T sensors can be connected to each unit.

Name—Each node or sensor can be identified with a name (chosen and entered by user) to help identify sensors mounted in the facility. Sensor names can be up to four alphanumeric characters long, uppercase or lowercase, and special characters are permissible: & * / . + - : @ \

The factory default is blank.

Sensor Reading: Two temperature thermistors are attached to each 2T sensor. This portion of the line displays the maximum or average sensor value of the two readings measured. SB02 programming determines whether the reading shows the maximum or average calculation. If a sensor is connected but no reading is available, verify that the CANbus cables are properly inserted and that the DIP switches and sensor termination are correct.

Sensor Setup: Defines what the sensor is used for. Three options are available: **Disabled, Reference** and **Control**. *Disabled*, the factory default setting, is used when a sensor is not connected. *Reference* is for remote sensors used for remote monitoring. *Control* is for sensors used for controlling fan or cooling output.

9.0 MONITORING POINTS

Emerson has created the Liebert Monitoring Points Generator to assist in locating the exact monitoring points needed for a specific unit. Contact your local Emerson representative to have this run for your unit. Once this generation is run, it can be saved in various formats—.pdf, .xls or .csv—to be provided with the submittals, quotations and to the BMS commissioning agent for point mapping.

Figure 165 Liebert Monitoring Points Generator interface

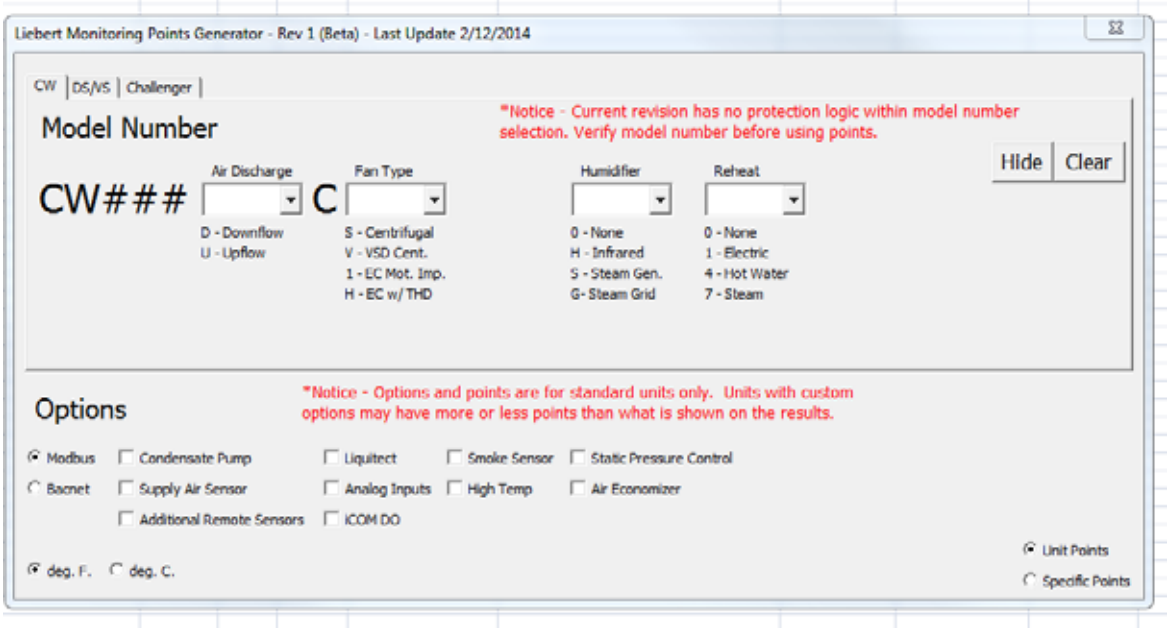
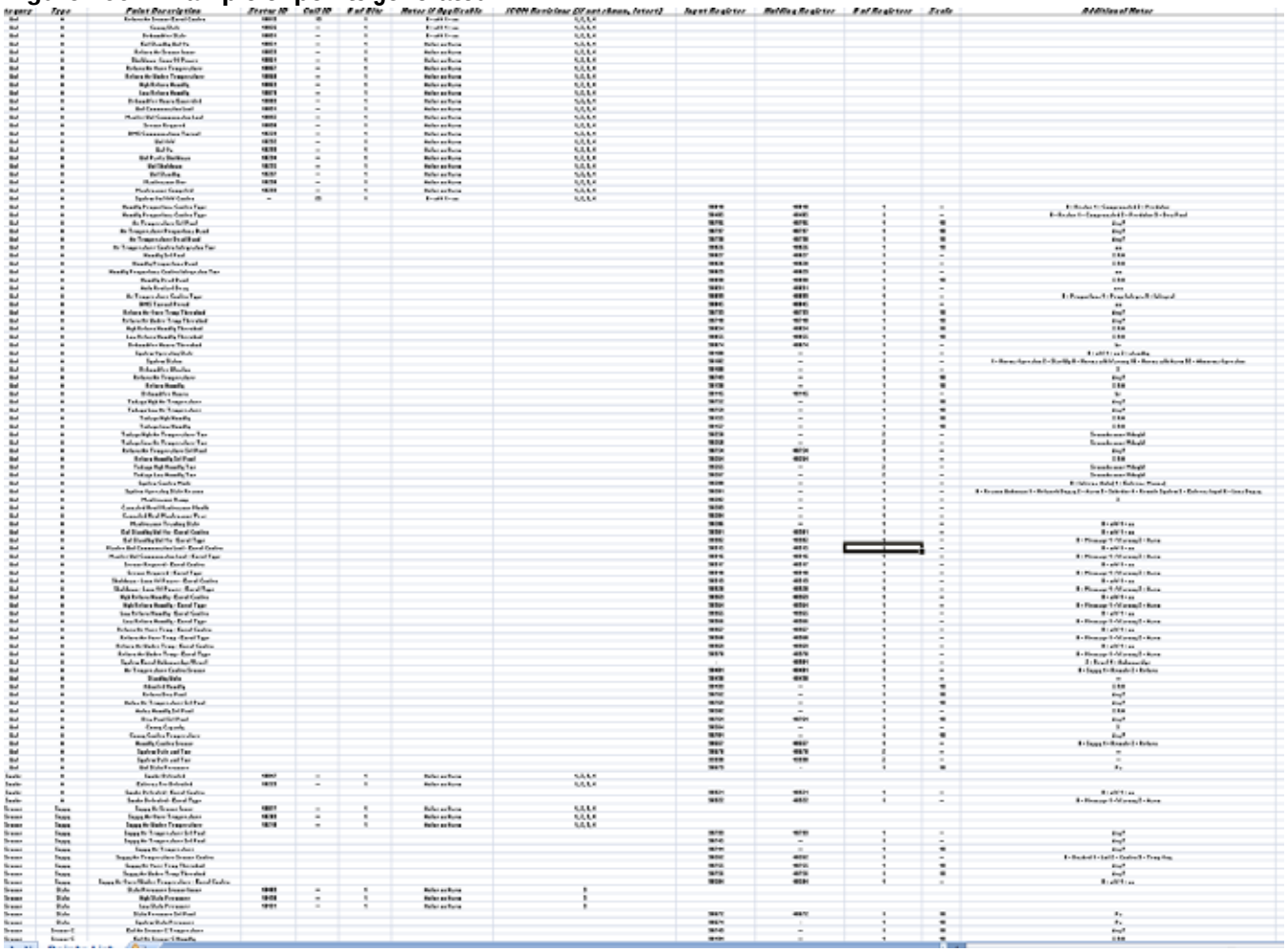


Figure 166 Example of points generated



Notes

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